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ABSTRACT

This study reports on a method of measuring the equity of state school finance systems. This method attempts to determine the extent to which the system makes adequate provision for education, treats equals equally, and treats unequals equitably. It presents a multiple regression approach to the problem, which allows each goal of school finance to be examined separately. Four indicators were developed: (1) measures of the extent to which variation in revenue or expenditure per pupil is related to variations in wealth, tax rate, or special needs and costs or is unexplained; (2) measures of operating revenue or expenditure per pupil for all purposes; (3) a measure of average revenue or expenditure per pupil for normal pupils; (4) the weightings implied by additional expenditures for pupils with special needs or in districts with high costs. The measures thus developed are then tried on actual data from four states (Connecticut, Illinois, New Jersey, and New Mexico) and comparisons made. The problem of explaining the statistical procedure to a layperson is addressed in a chapter that presents the measures in simple and understandable terms. A lengthy appendix contains the measures for the four states, correlation matrices, and univariate and bivariate measures for the four states. (Author/JM)

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MEASURING THE EQUITY OF SCHOOL FINANCE SYSTEMS

by

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INTRODUCTION

This study reports on the development of a method of measuring the school finance system of a state to determine the extent to which it makes adequate provision for education, treats equals equally, and treats unequals equitably. It presents a multiple regression approach to the problem, which allows examination of the different goals of school finance separately. The following indicators are developed, which may be looked at separately or as a group:

1. Four measures of the extent to which variation in revenue or expenditure per pupil is related to variations in wealth, in tax rate, in special needs and costs, or is unexplained.

2. Two measures of operating revenue or expenditure per pupil for all purposes. One (the mean) measures the adequacy of provision, the other (the coefficient of variation) measures the dispersion about the mean.

3. A measure of average revenue or expenditure per pupil for normal pupils.

4. The weightings implied by additional expenditures for pupils with special needs or in districts with high costs:

   a. Additional weighting for compensatory pupils

   b. Additional weighting for handicapped pupils

   c. Additional weighting for bilingual pupils

   d. Additional weighting in small districts (less than 500 ADM)

   e. Additional weighting in large districts (more than 10,000 ADM).

The measures thus developed are then tried on actual data from four states (Connecticut, Illinois, New Jersey, and New Mexico) and comparisons made.

This approach to be problem of measuring equity in school finance is more comprehensive than other attempts, and less apt to give misleading answers resulting from confounding of equity goals. The problem of explaining the statistical procedure to laymen is addressed in a separate chapter which presents the measures in simple and understandable terms.

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CHAPTER I

BACKGROUND

The first goals of school finance at the state level, back in the 1800s, were aimed at insuring access to education for all children. This usually took the form of laws which forced communities to operate schools, and later, compulsory attendance laws. There was often no state money accompanying these mandates, and schools were often supported very poorly at the local level. A second goal, then, became that of insuring an adequate education for all children. This was Cubberley's primary goal, and the mechanism was, in essence, a flat grant to all districts sufficient to insure at least a certain minimum expenditure.

Subsequently, the goal of wealth equalization became important, and this has continued to the present time. The three basic philosophical positions were staked out in the 1920s and 1930s. Henry Morrison was of the opinion that education should be provided on an equal basis to all children, and therefore that it should be completely financed by the state.[1] Strayer and Haig believed that it was only necessary for the state to provide a minimally adequate education to all children, with local communities free to provide extras if they wished to so do out of local taxable resources.[2] This philosophical position is reflected in the foundation plan. The third position is that each community should be free to decide how much it wants to spend on education, but that the ability of communities to raise money for education

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[1]Henry C. Morrison, School Revenue (Chicago: University of Chicago Press, 1930).

[2]George D. Strayer and Robert M. Haig, Financing of Education in the State of New York (New York: The Macmillan Co., 1923).

should be equalized. This position was put forth by Updegraff and King, and the solution was percentage equalizing.[3] Essentially the same idea was promoted as power equalizing in the late 1960s by Coons, Clune and Sugarman, and has been much more successful recently. A fourth possibility has not been presented as a philosophical position by any prominent writer, but has come about in a few states anyway. This is the idea that expenditures on students should be equalized, but that it is unnecessary to equalize tax rates. This is the result of expenditure or revenue limits without adequate state equalization money.

Another goal of state school finance has been to take care of the needs of special students. This came considerably later than the goal of wealth equalization, and has developed slowly. First came special state aid (or special schools) for the blind and deaf, followed by state aid for educating the mentally retarded. Other categories of handicap were added later, with the categories and the amount of state aid varying from state to state. A second category of special need assumed importance in the 1960s: the environmentally disadvantaged. Federal money under ESEA Title I was supplemented by similar state programs in a number of states. Concern for students with special needs has accelerated recently, with the passage of federal legislation guaranteeing an appropriate education for all handicapped children and federal mandates for bilingual instruction in addition to the Title I program for disadvantaged children.

A final goal of school finance has been to take care of legitimate differences in the cost of providing equivalent education in different districts.

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[3]Harlan Updegraff and Leroy A. King, Survey of the Fiscal Policies of the State of Pennsylvania in the Field of Education (Philadelphia: University of Pennsylvania, 1922), Chapter 2.

The main state allowances have been for two things that affect rural school districts most: need for extensive bus transportation, and small classes (necessitated by population sparsity) that make the cost of education per student much higher. All states provide state aid of some sort for bus transportation, and many states provide increased aid for small school districts or districts with necessary small schools. In addition to this, a number of states, mainly in the South, provided increased aid to districts with teachers who had a lot of training or experience. The apparent rationale was that these districts had extra costs for teachers. This implies that the districts have no control over the training and experience of their staffs. A compelling argument can be made, however, that at least in a time of expanding enrollments districts have a great deal of control over teacher training and experience, and that the state aid for this purpose was merely rewarding districts that had been able to acquire a superior staff because they were already rich. This particular form of state aid has been abandoned in most states, and now remains only in Washington and New Mexico.

Only Florida has tried a comprehensive adjustment for cost differences, through the use of a cost-of-living adjustment. This is flawed, for a measure of the cost of living does not necessarily act as a good measure of the cost of educating. In addition, the adjustment was primarily a political compromise, designed to pump enough additional money into Dade and Broward counties to assure the votes of their legislators.

The idea of a comprehensive cost adjustment has only come about during the last few years. Harvey Brazer, in Michigan, was the first to try to develop the methodology for such an adjustment.[4] He focussed, as have others since, on

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[4]Harvey E. Brazer, "Adjusting for Differences Amont School Districts in the Costs of Educational Inputs: A Feasibility Report," in Selected Papers in School Finance 1974 (Washington, D.C.: U.S. Dept. of HEW, 1975).

teacher salaries, for they are the largest part of any budget. The reasoning is that districts pay different amounts for teachers for a number of reasons, some of which can be controlled by the district and some of which can't. Those which can be controlled by the district are demand variables, and reflect district desires for teachers of greater or lesser quality, or for higher or lower pupil-teacher ratios. Those that cannot be controlled are supply variables. They include the desirability of the community as a place to live and the desirability of the schools as a place to teach. The idea is to compensate districts for differences in costs caused by supply variables, but not for those caused by demand variables. The trouble is that separating the two necessitates a sophisticated econometric analysis. So far no state has written such a comprehensive cost adjustment into its school finance formula, although studies toward that end have taken place in Missouri and California.[5]

Since the late 1960s there has been a wave of school finance reform across the nation. Part of it was caused by the success of the Serrano suit in California, and the similar suits it encouraged in other states. Partly it was the result of other pressures, for a number of states reformed their school finance formulas without the threat of a court suit. Some states also, such as Oregon, have made incremental changes that apparently add up to a significant reform.

It would seem that these pressures for reform, and the reforms they

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[5]Jay Chambers, "Educational Cost Differentials: The Conceptual Framework and an Empirical Analysis for School Districts in the State of Missouri," prepared for the Educational Finance Committee of the Governor's Conference on Education in the State of Missouri.

spawned, would have set off many analyses to determine the extent to which the reform was actually effective. However, any such efforts have, in general, been sporadic and confined to a single state. The fact is that there is no agreed-upon methodology for testing the extent to which school finance goals have been met. There is no consistent way in which we currently can compare states with one another, or one state with itself over time. This study is an attempt to do that.

There have been several attempts at establishing a methodology for comparisons before. The paragraphs below will give brief descriptions of the methodology of several other attempts, and discuss the strengths and weaknesses of them.

The NEFP Measure

The first attempt at constructing a measure consistent across states was made by the National Educational Finance Project in the early 1970s. The NEFP method is based on a typology of equalization, with all state and local funds placed into one of five levels of equalization,[6] based on the following criteria:

Level 0: When state funds are allocated in such a manner as to leave districts with the same or greater differences in local financial capacity to support education as they were before receiving state allocations they are classified in Level 0. For example, a minimum guarantee of funds to certain wealthy districts which are not entitled to receive state funds under strict

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[6]The process of applying the NEFP Typology and the associated measure of equalization is described in Roe L. Johns and Kern Alexander, Alternative Programs for Financing Education (Gainesville, Florida: National Educational Finance Project, 1971), pages 231-251.

interpretation of the equalization formula would be classified as Level 0.

Level 1: State funds allocated on the basis of a flat amount per unweighted pupil, a basis which ignores both differences in student needs and local ability to pay, are classified as Level 1.

Level 2: A flat grant per weighted pupil or other method that takes into account pupil need but not differences in local ability to pay is classified as Level 2.

Level 3: A grant that takes into account differences in local ability to pay but not pupil needs is classified as Level 3. The pure foundation plan is an example.

Level 4: If the state grants take into account both pupil need and local ability to pay, they are classified as Level 4.

Local funds are also classified similarly. The required local share in proportion to local taxpaying ability that is deducted from the state equalization allocation is classified as either Level 3 or Level 4, depending upon the Level of the state program against which the local funds are offset. The remaining local unequalized leeway is classified as Level 0.

Having classified all state and local money into one of these five levels (there are several pages of instructions for applying the typology to foundation programs, percentage equalizing programs, and various categorical grants), an Equalization Score is then developed. This is done in the following way:

"1. Level 0 funds are assigned a score of 1 in order that other levels may be made proportional to it.

"2. Level 1 funds have at least 5 times the equalization value of

Level 0 funds. As Level 1 funds approach 100 percent of total state and local funds, the equalization value of Level 1 funds approaches the value of Level 3 funds. Therefore, the equalization value of Level 1 funds should be computed as follows: [5 + (.02 x the percent of total state and local funds in Level 1 x 100)].

"3. Level 2 funds have at least 20 percent more equalization value than Level 1 funds. However, as Level 2 funds approach 100 percent of state and local funds, the equalization value of Level 2 funds approaches the value of Level 4 funds which have the maximum equalization value. Therefore, the equalization value of Level 2 funds should be computed as follows: [6 + (.024 x the percent of total state and local funds in Level 2 x 100)].

"4. As indicated above, Level 3 funds are assigned an equalization value of 7.

"5. Level 4 funds are assigned the maximum equalization value of 8.4 which is 20 percent higher than Level 3 funds."[7]

Using this method, an equalization score was developed for each state for the year 1968-69. The scores ranged from 8.400 for Hawaii to 2.295 for Connecticut. Note that 8.4 is the highest score possible, representing a system in which all of the state and local funds are classified as Level 4.

There are so many things wrong with this method of assigning equalization scores that it is difficult to know where to begin in criticizing it. Perhaps a useful place to start is to note that since Hawaii received a perfect score of 8.4, it is apparently impossible to improve the equalization in that system. It has done this by having full state support of education, so that

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[7]Johns and Alexander, op. cit., p. 248-9.

local differences in ability to support education are of no importance. However, in addition, in order to get this perfect score it is necessary to allocate funds according to pupil needs. It is of absolutely no importance in this typology whether such allocation for pupil needs is only the allocation of 10% more to high school students than to elementary students, or whether there is a comprehensive weighting system taking into account the needs of handicapped, compensatory, gifted, and vocational students as well. It appears that in trying to develop this equalization score, the NEFP has mixed apples with oranges. The attempt to equalize for differences in local taxpaying ability is an attempt to establish equality of expenditure, that is, to treat equals equally. The attempt to allow for differing pupil needs is an attempt to treat unequals equitably, and there are no guidelines for doing this as there are for establishing equality. It is a mistake to try to mix these two in one equalization score.

A second problem is that a continuum has been constructed from a typology. This has been done by arbitrarily assigning values to the various equalization levels. Based on an equalization score of 1 for Level 0 funds, Level 1 funds are assigned a score of 5. This is apparently based solely on the assertion that "in states organized into units large enough to permit reasonable efficiency and economy of scale [this size is undefined by the authors], districts will usually vary at least from 5 to 1 or 7 to 1 in equalized valuation per pupil."[8] Level 2 funds have been assigned a score of 6 based on an assertion that they are at least 20% more equalizing than

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[8] Ibid., p. 247

Leval 1 funds. This justified by the assertion that "although the cost per pupil for vocational education, exceptional education, compensatory education may be as great as 2 or 3 to 1 and the cost of transportation and the extra expense of low pupil-teacher ratios in sparsely settled areas may be considerable, the necessary variation of the total per pupil costs among efficiently organized districts probably does not exceed 20 percent for a significant number of districts within a given state." [Emphasis in original.][9] Level 3 funds have been assigned a score of 7 with no justitication given, and Level 4 funds are alleged to be 20 percent more equalizing than Level 3 funds utilizing the same argument as for Level 2 funds, giving Level 4 funds a score of 8.4. It can be seen from these quotes that the reasoning behind the NEFP equalization score is arbitrary at best.

Another problem with the NEFP measure is that it does not recognize a difference between the kind of wealth equalization implied by expenditure equalization and that implied by wealth neutrality.

A final important problem with the NEFP measure is that it looks at overall state allocations and the professed intent behind them, rather than looking at the actual effect of the allocations upon the school districts of the state. All in all, it would appear that the NEFP model has a number of flaws, all of them fatal.

The Federal Measures

The second attempt worthy of note is that of USOE in connection with

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[9] Ibid., p. 247.

the federal impact aid program. In 1974 Kansas decided to include federal impact aid to local school districts as part of district resources in calculating a district's entitlement for state equalization aid. This was done on the reasonable basis that impact aid constitutes federal money in lieu of taxes, and is intended for general support. USOE took the position that impact aid could not be used this way, and threatened to cut off the aid. It said that the state was simply using the impact aid as a substitute for state aid. A compromise was finally reached whereby Kansas was allowed to continue its practice, but other states were to be allowed to do this only if they had established an adequately equalized system of school finance. The need arose immediately to determine what constitutes adequate equalization. The initial rule (published in May, 1975) specified only an expenditure disparity measure. All special purpose allocations from the state were to be disregarded, such as those for handicapped education, transportation, etc. Local contributions to equalized shared costs for special cost differentials were also to be excluded. The remaining state and local funds were to have a maximum percentage dispartiy of 25% between the 5th and 95th percentile of expenditures per pupil (on a pupil unit basis).

Those states which had adopted the philosophy of equalizing taxing ability (rather than equalizing expenditures) complained that this was unfair, and a second test, called the federal wealth neutrality standard was adopted, with states free to use either one. The measure is exceedingly complicated. and would appear to be subject to all kinds of manipulation. A brief description is taken from an RFP issued by USOE in July, 1978:[10]

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[10] "A Study of the Federal Wealth Neutrality Standard," RFP No. 78-77, USOE, July 7, 1978.

To determine the percentage of a State's revenue for public education which may be deemed to wealth neutral, revenues are divided into four categories depending upon the type of program under which they fall. Revenues in each of these four categories are then separated into two groups, neutral and non-neutral. The first category is revenue under the State equalization program. Generally speaking, revenues under this program are deemed wealth neutral to the extent that each LEA receives the same amount of dollars per pupil under this program for the same tax effort. Also, all extra revenues provided for special needs are considered wealth neutral. Revenues not equally available to all LEAs under this program are deemed non-neutral.

Revenues received under any other program of State aid represent the second category and are deemed wealth neutral to the extent that LEAs receive the same dollar amount per pupil from such programs or funds are provided for special needs.

Revenues raised outside the equalization program by the LEAs are the third category and are considered to be wealth neutral to the extent that each LEA receives the same amount of dollars per pupil for the same tax effort. Finally, LEA revenues which fall outside the equalization program and come from non-tax sources are wealth neutral to the extent that each LEA receives and is allowed to spend the same amount [sic] of dollars per pupil of such revenues.

Once revenues have been sorted into netural and non-neutral categories as above, the total of wealth neutral funds are expressed as a percentage of total State and local funds for public education in the State. The criterion is met if 85% of total state, intermediate, and local funds are neutral by this definition.[11]

The Federal measures have been designed only for one specific purpose: to determine whether a state may count impact aid as part of the local share for equalization purposes. They do not have the general purpose of attempting to compare states with each other or with themselves over time.

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[11] Ibid., Attachment C, p. 2.

The measures adopted are, as stated earlier, exceedingly complex. Not only are the results probably subject to substantial manipulation, but it is highly unlikely that comparable data for all or a large number of states will be available in the foreseeable future. A strength of the federal measures is that they do attempt to separate money designed to take care of differences in educational needs and costs from money intended for wealth equalization. However, the assumption is made that in most cases these allocations for special needs and costs are wealth neutral, when this is actually an empirical question.

Finally, the federal measures make no attempt to discern the extent to which states have attempted to deal with issues of differences in need and cost, for this is not part of their announced purpose.

Finally, the federal measures do recognize the two different philosophical positions on wealth equalization, and provide separate measures to test whether there is substantial equalization under either of them.

The Killalea-USOE Measures

A third study is one undertaken jointly by USOE and Killalea Associates.[12] This study uses the ELSEGIS data bases for 1970 and 1975, with assessed valuation data added from the federal census data. The variable examined is current operating expenses, less federal aid.[13] Two measures are used

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[12] Lawrence B. Brown III, et al., "School Finance Reform in the Seventies: Achievements and Failures," USOE, Sept. 30, 1977 (processed).

[13] Total current operating expenses are reduced by the ratio of state and local revenue plus federal impact aid to total revenue. Thus, impact aid is counted as if it were state or local money.

to examine expenditure discrepancies: the range from the 5th to the 95th percentile as a percentage of the average (the same measure used in the federal expenditure discrepancy measure, but not the same variable), and the coefficient of variation. The measures are calculated for both 1970 and 1975, and ratios between values for the two years used to express the extent of change over time. In addition the study tries to examine the extent to which expenditures are dependent upon wealth by taking the average expenditure for the first quartile of wealth, the second and third quartiles combined, and for the fourth quartile, and expressing each of these as a percentage of the statewide average expenditure. A similar approach is used for comparing expenditures in districts in central cities, districts in SMSAs but outside central cities, and districts outside SMSAs.

There are several flaws in the Killalea-USOE approach. One is in the data base. ELSEGIS contains only a sampling of districts, and the sampling rate is lowest in the small districts, where the greatest discrepancies in expenditures can be expected. Second is that by using current operating expenditures as the variable, they are allowing the confounding influence of allocations for such things as education of the handicapped, or for transportation, to creep into the measure of expenditure disparities. Third is the fact that this approach does not recognize wealth neutrality as an alternate philosophical position with regard to wealth equalization. A major strength of the Kilalea-USOE study is that they have used an approach that can be applied to all states with currently available data. Unfortunately, the problems mentioned above make the conclusions subject to substantial doubt.

The General Research Corporation Measures

A fourth study was apparently done in conjunction with the one just discussed. It was done for USOE by General Research Corporation, but GRC subcontracted with Killalea Associates for part of the work.[14] The study begins by examining the concept of equality of educational opportunity. It notes the desirability of using an output measure rather than an input or process measure, but also notes the unavailability of an outcome measure at the present time. It concentrates on input measures, and perhaps makes its greatest contribution in defining a series of input variables, each of which can be calculated from currently available data. The variables are:

1. Current expenditures per pupil, excluding transportation.

2. Number of classroom teachers per pupil. This is an attempt to get at actual resources delivered, rather than money expenditures. It ignores the fact that teachers differ in quality, that there may be differences in the extent to which teacher aides are used, and that there may be differences in expenditures on other resources.

3. Instructional staff weighted by degree level. This counts the number of staff per pupil, with each staff member weighted according to degree level. The weight is in proportion to estimated years of education: 14 years for less than a bachelor's degree, 16 years for a bachelor's, 18 years for a master's and 21 years for a doctorate. This is an attempt to control the preceding measure to some extent for differences in quality (based on the assumption that quality differences are associated with differences in amount of education).

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[14] Educational Opportunity: The Concept and its Measurement (Washington, D.C.: National Center for Education Statistics, U.S. Dept. of HEW, 1978).

4. Current expenditures with salaries controlled by degree level. This is an attempt to combine a measure of personnel with a measure of other inputs. Teachers are multiplied by the national average salary for their degree level, and to this are added other current expenditures.

5. Current expenditures with salaries controlled by degree level and adjusted for "quality." The average salary for teachers at each degree level was determined for districts separated into four different urbanization categories (center city, suburban SMSA, other urban, and rural), and nine geographical areas of the country. This gave averages for 36 categories of districts. The difference between actual salaries in a district and those predicted by its category were presumed to be caused by differences in "quality" of teacher. The ratio of actual to predicted salaries for the district was used to multiply national average salaries for each degree level by the number of teachers in that category in the district, and to this was added all other current expenses.

6. A composite measure. A factor analysis was used to determine what mixture of the preceding five factors was most successful in explaining their total variance. The result was a composite in which 1, 2, 3, and 4, and 5 contributed 19%, 18%, 20%, 23%, and 20%, respectively. It appeared to the authors of the study that variable 4 (current expenditures with salary controlled by degree level) was the best of the indicators. The attempt to control "quality" in variable 5 seemed to introduce random fluctuations, rather than improving the measure. Although technically the composite measure (number six) is probably a better measure, the authors found it did not improve predictions much, and 4 was intuitively much easier to understand.

Each variable used was finally weighted by district size. The investigators found that resources varied by district size, with a U-shaped curve. School districts were put into 9 categories by size (the smallest was less than 1500 pupils, the largest over 200,000), and the average value of the variable for each size range calculated. The assumption was made that this average constituted a reasonable value for the variable, or in other words, that these differences associated with size represented appropriate responses to economies or diseconomies of scale. The value of the variable for a particular district was then expressed as the ratio of the actual value of the variable for the district to the average value for all districts in that size range. The result of all of this was a set of six resource variables for each school district.

For comparison with these variables, a set of socioeconomic variables was also constructed. These were the following:

1. Percent of population black in the district.

2. Percent of population Spanish-speaking.

3. Proportion of district population in families below poverty level.

4. The product of percent black and percent below poverty. This tests interaction effects of variables 1 and 3.

5. The product of percent Spanish-speaking and percent below poverty, which tests the interaction effects of variables 2 and 3.

6. Ability to pay. This is a composite of equalized property value per pupil, per capita income, per pupil income, and proportion of families with over $15,000 income in 1969. These four were regressed against local revenue received by the district, giving regression coefficients that indicated that the four factors should be weighted respectively 29%, 36%,

24% and 11% in constructing the ability variable.

7. A measure of financial effort. This was defined as state plus local revenue divided by the ability measure defined above.

8. Degree of urbanization. Each district is assigned a score ranging from 0 to 3 depending on the percent of population residing in urbanized areas and on the district's status as rural, small town, suburban SMSA or central city SMSA.

9. Ratio of pupils in attendance to pupils enrolled.

First, measures were developed from the variables. (Note the distinction that is being made here, and throughout this report, between variables and measures. A variable is a data item, primary or constructed. There are data on a variable for each district in the state. A measure is a statistic calculated from one or more variables. A measure is a single figure, or a small number of figures that summarize information,whereas a variable is a category of data with a data item for each district.) The first measures are those of variation in resources and revenues. They are thus univariate measures. Three were calculated for each of the six resource variables:

1. The mean of the variable. Because of the way these variables were constructed, the mean for the U.S. as a whole on each is 1.000, but the mean for different sections of the country, or for local, state, or federal resources varies.

2. Percent variation. This is the standard deviation divided by the mean, also known as the coefficient of variation.

3. The Gini index. This is the standard Gini, in which districts are arrayed in ascending order of the resource variable, rather than the

Hickrod Gini, in which the districts are arrayed in ascending order of ability to pay.

4. A ten-part measure in which the pupils are arrayed in ascending order of the resource variable and the mean for the variable calculated for each decile of students. This allows an opportunity to see the extent of departure from normality, which would not be evident in a measure like the percent variation.

The second measures are bivariate measures, testing the association of each of the resource variables with the various socioeconomic variables. Each of the socioeconomic variables is divided into "high," "medium," and "low" categories. The high and low categories contain the top and bottom 20% of the pupils, and the medium category contains the remaining 60%. The mean and the percent variation of each resource variable for each of the three categories of each socioeconomic variable is calculated. In addition, the correlation of each resource variable with each socioeconomic variable is given.

The preceding analyses are performed for the U.S. as a whole, for specific sections of the country, and for individual states. Analyses are also made of the proportion of variance in the various analyses that is due to within-state variance and that due to across-state variance.

This study is an important contribution. First, it explains in detail various criteria of equity in educational finance, and explains why we are, for the forseeable future, stuck with input variables rather than the desired output variables. Second, and perhaps most importantly, it attempts to define a set of different resource indicators and to evaluate them. Other studies have simply used such measures as current expenditures, or state and

local current revenue without justifying their use. Third, a variety of measures has been calculated and displayed. The authors avoid making any recommendation as to the best measure to use.

There are several problems with the study. One is that Census and ELSEGIS data are used. The trouble with Census data is that it is calculated for school districts by mapping census tracts on districts. Actual experience with this in several states leads me to doubt the reliability of data calculated in this fashion. In addition, the Census data are for 1969. The principal trouble with the ELSEGIS data is the fact that they are only for a sample of districts, and small districts substantially underrepresented.

Another problem, which this study shares with all of the other studies reported here, is that only univariate or bivariate measures are used. Since the resource measures include expenditures on normal students and also on special need students, apparent inequities may simply be the result of legitimate allowance for differences in need. Contrariwise, these allowances for need might actually mask inequities in spending on normal students. The same problem arises in the bivariate analyses of the relationship of the resource measures with the various socioeconomic variables. The techniques used do not allow one to hold one or more variables constant while examining the relationship of two. Undoubtedly, the reason for univariate and bivariate measures is an attempt to devise measures that can be understood by the lay public. However, such an approach runs the substantial risk, in trying to be simple, of being wrong.

The School Finance Cooperative Measures

The final study to be reviewed here is that undertaken by a group that has been called the School Finance Cooperative. It consists of a group of researchers who have been working in the field of school finance and who have established data bases on various states. The group was called together jointly by the Ford Foundation and NIE, which have been providing much of the funding of the researchers. The whole effort has been coordinated by Robert Berne. Berne wrote a concept paper in which he identified a number of measures that could potentially be used to test equity.[15] The researchers were then called together by Ford and NIE in November, 1977, to use this paper as a basis for deciding which were the most appropriate measures to use in assessing the equity of school finance systems. The researchers were directed to perform the necessary analyses on the data in their possession. This researcher was part of that group, and performed the analyses for the states of Florida, New Mexico, and Texas, utilizing the data gathered by Robert Brischetto, of the Intercultural Development Research Association of San Antonio. The results of these analyses were then shipped to Berne, who analyzed the extent to which the measures gave similar results. The goal was to find a small subset of measures that could be used to monitor equity in school finance across states and in a particular state over time. A second publication reporting on the results of Berne's analyses of the results submitted by the other researchers was issued.[16]

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[15]Robert Berne, "Equity and Public Education: Conceptual Issues of Measurement," (Graduate School of Public Administration, New York University, October, 1977)

[16]Robert Berne, "A Methodological Assessment of Education Equality and Wealth Measures," a report to the School Finance Cooperative (Public Policy Research Institute, Graduate School of Public Administration, New York University, July, 1978).

The emphasis of this and the proceding study was quite different. The NCES study emphasized the development of variables which measured resources with different degrees of sophistication. A sophisticated variable of ability to support education was also developed. The measures used in the assessment of equity, however, were relatively few in number. The Berne effort, on the other hand, seems relatively uninterested in the variable used for resources, but very interested in the measures. No fewer than 19 different measures were analyzed, one for adequacy of provision, nine for variation in the resource measure, and nine for the measurement of fiscal neutrality. The only resource measure used was state and local current revenue per pupil. The measures used were as follows:

I. Adequacy: the mean of the resource variable.

II. Variation in resources

1. Range: the difference between the highest and lowest spending district.

2. Restricted range: the range between the 5th percentile and the 95th percentile. (All of the analyses were run both using the district as the unit of analysis and using the student as the unit. When using the district, the restricted range would be between the 5th and 95th percentile district. If there are 100 districts in the state, it would be between the 5th and 95th district when they are arrayed in order of revenue per student. When the student is the unit of analysis, the restricted range is between the 5th and the 95th percentile of students. The same is true of all of the measures.)

3. Federal range ratio. This is the federal measure of equality of

expenditure, mentioned earlier in connection with the federal regulations on the use of impact aid as local revenue. It is the restricted range divided by the value of the 5th percentile.

4. Relative mean deviation. This measure looks at the differences between each district's per pupil revenues and expresses the absolute value of these differences as a percentage of total expenditures in the distribution.

5. Permissible variance. This measure is based on the dollars needed to raise all districts spending below the median level of per pupil expenditure to the median level. The measure is constructed as a ratio: the numerator is the actual spending in the districts below the median level and the denominator is the spending that would occur if all of the districts spending below the median spent at the median level.

6. Variance. This is the square of the standard deviation of the distribution.

7. Coefficient of variation. This is the standard deviation divided by the mean.

8. Standard deviation of logarithms. This is simply the standard deviation of the distribution of natural logarithms of the revenue data.

9. Gini coefficient. If districts are arrayed in ascending order from lowest to highest revenue per student, we can plot this ordering on a graph using the percentage of the population on the X axis and the percentage of revenues accruing to the population on the Y axis. With complete equality of revenues the resulting graph would be a straight line at a 45° angle. Any inequality of revenues would result in a line that sags below the 45° line, and this is called the Lorenz curve. The Gini coefficient is the

percentage of the area below the 45° line that is between the Lorenz curve and the 45° line. The smaller the Gini coefficient, the greater the equality of the distribution.

III. Measures of Fiscal neutrality

1. Simple correlation between revenue and wealth. Wealth was defined for this study as equalized assessed valuation per student.

2. The rate of change of expenditures for each $1000 of change in wealth. This is the regression coefficient for the equation predicting revenue from wealth, and is therefore the slope of the regression line.

3. The slope at the mean of a regression line for a prediction of revenue using wealth and the square of wealth.

4. The slope at the mean of a regression line using wealth, wealth^2, and wealth^3 as predictors. Measures 3 and 4 are designed to test whether nonlinearity of the relationship makes a difference.

5. The difference between two predicted values for revenue using the regression equation of measure 4 and predicting revenues at plus and minus one standard deviation from the mean.

6. The Hickrod Gini coefficient. This is calculated just as the regular Gini coefficient is, but the districts are first arrayed in order of increasing wealth rather in order of increasing revenues. The Lorenz curve would still compare percent of the population with percent of revenues accruing to the population. This Gini coefficient purports to measure the amount of variation in revenues caused by variation in wealth.

7. Elasticity of the simple regression. This is the slope calculated in 2 above multiplied by the ratio of mean wealth to mean revenue.

8. Elasticity of the regression in 3 above, calculated the same way.

9. Elasticity of the regression in 4 above.

For the Berne study, data were obtained for 29 states. However, not all of the measures were calculated for all of the states. An attempt was made to get data for at least two years for each state, preferably for 1972-73 and 1975-76. Again, this was not done in all states. As a result, many of the Berne analyses were run on fewer than 29 states, with the minimum number analyzed being 18.

As stated before, the attempt here was not to determine whether particular states were more equal than other states, or had become more equal over time. Rather, the attempt was to specify the characteristics of the various measures, and the value judgements that were therefore implied in using them, and then to determine with actual data the extent to which the measures tend to move together. The conclusion, whether one is using the measures to look at a single state over time or at a number of states at a point in time is that the measures do not move together, and that therefore the measure used will affect the determination of whether there has been an improvement in equality over time, or whether one state is more equal than another. The implication is that we must specify the measure or measures to be used based on the value judgements embodied in them.

CHAPTER II

DESIGN OF THIS STUDY

Each of the preceding studies has important flaws, which this study attempts to avoid. The most important are:

1. Use of inadequate data bases. The two studies which use the Census/ELSEGIs data are using data on a sample of districts in the state. The sample is stratified to include fewer of the small districts, and includes no districts with fewer than 300 pupils. Yet it is in the smallest districts that the greatest variations occur. In addition, the Census data used are based on 1969 information, and have been accumulated to school districts by mapping census tracts on school district boundaries. Use of the census data in several states has convinced me that these data are often misleading, particularly in small districts. For example, a county may have a number of school districts, yet not be tracted at all. The districts in the county, if they are included in the ELSEGIS sample, are simply given the county average value of the census variables.

2. Use of inadequate concepts. The NEFP study is the prime example of this.

3. Failure to separate allocations for special needs and for cost differences from allocations for wealth equalization. Only the "federal measure" used in conjunction with impact aid allocation makes any attempt to do this. However, the method of doing so involves accounting procedures that are subject to abuse, and the assumptions made about which of the special allocations are wealth neutral are not based on any empirical data.

The USOE-Killalea, NCES, and Berne studies make no attempt to separate special need and cost allocations. The NEFP study confuses the issue by attempting to combine the two.

4. Failure to develop measures for any other goal of school finance than wealth equalization. Although other goals, such as taking care of need and cost differences, have long been part of school finance, the studies above have completely ignored them in their measures. The fact that they acknowledge this lack does not excuse it. The fact that some of the studies have deliberately allowed adjustments for need and cost differences to contaminate their measures of fiscal equalization is doubly intolerable.

This study has embarked on an attempt to remedy the abovementioned shortcomings.[17] What is immediately clear is that any attempt to separately analyze the effects of multiple goals must have a way of separating the allocations for those goals from each other. One way of doing this is to separate them at the data stage, and analyze the allocations for different

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[17]This was not the original goal of the project, which was to develop a series of univariate and bivariate measures and test them on several states. Delays in the approval process for this project delayed its start for almost a year. By this time others were doing much the thing which had been proposed for this project. This is undoubtedly a fortunate thing, for the problems mentioned above were not foreseen at the time the project was proposed. As a result the revised project is a substantial improvement on the original proposal. However, as part of the efforts of the Berne-School Finance Cooperative study, I have also done what I originally proposed to do. The results are shown in Appendix D.

purposes separately. This is what the federal measure attempts to do. The problem is that it is not at all clear that this separation can be made in many (or perhaps most) cases. Take, for example, transportation aid. If a state provides 100% of the cost of providing transportation, most people would concede that it is adequately taking care of this cost difference, and that wealth equalization is not involved. But what if the state provides only 50% of the cost of transportation? Districts then have to support the rest of the cost of transportation out of unequal local funds. California used a transportation formula that took into account district tax-raising ability, but it was a different formula than that for general aid. Both of these latter have elements both of allowance for cost differences and of wealth equalization or disequalization. Simply analyzing separately does not solve the problem.

A second problem is that even if one could conceptually make the separation at the data stage, it is impossible to do so on a consistent basis from one state to another. Some states use a weighted pupil method to allow for differing needs. Others use categorical flat grants, while still others base their categorical aid on a cost-reimbursement method. Some states allocate the transportation allowance (and other similar ones) separately, but others include it in the general aid allocation, from whence it is difficult to make the separation. Finally, local tax money is used for a variety of purposes, and there is no way of separating the uses to which it is put from each other. In short, enticing as it may be, the idea of separating the data for analysis is neither technically nor conceptually feasible.

The second way of making separate analyses is to make the separation statistically. Since the other method is infeasible, we are led inevitably to multivariate statistics. These are by their nature more complicated than univariate and bivariate statistics, but they are more apt to provide appropriate answers to our research questions because they can separate confounding factors. Multiple regression is the method chosen for this study.

In choosing an analysis method and data to use it on, the following considerations must be taken into account:

1. The method should provide an analysis based on what actually occurs in a state, rather than what we think ought to take place given the structure of the system. This rules out any approach like that of the NEFP, which analyzes laws and regulations. All of the other studies, this one included, have chosen, appropriately, to analyze actual distributions of money among school districts, whether these be expenditures or revenues.

2. The results produced should be understandable to informed laymen. This is presumably a good point of most of the measures used by the other studies, consisting as they do of simple univariate and bivariate measures. It is questionable, however, whether some of the measures in the Berne study meet this criterion. An example is the elasticity of the regression using wealth, wealth^2, and wealth^3. A major reservation of many to the use of multiple regression is the fear that it will not be understandable to informed laymen. I believe that an appropriate choice of measures, plus a good explanation, will alleviate this problem. In one chapter of this report I undertake to do that, and others may judge for themselves my success.

3. The measures should have certain desirable technical qualities:

a. They should be based on all of the data, not just on a portion of it. This makes such measures as the range, the interquartile range, and the federal range ratio inappropriate. All of the measures developed in this study are based on all of the data.

b. The measures of equity should be insentitive to differences in the average rate of expenditures or revenue among states or over time. This restriction does not hold (and is inappropriate) for measures of adequacy.

c. It should be possible to use either the district or the pupil as the unit of analysis.

4. The measures should be directly and understandably related to the goals of school finance. This means that the measures should indicate in a straightforward manner the adequacy of funding of programs for normal children and for various categories of children with special needs. The wealth equalization measures should similarly show in a simple manner the extent of expenditure equalization and of fiscal neutrality.

5. The variables used should be ones which are directly related to the goals of school finance.

6. The variables used should be ones that are currently or potentially available in all states on a comparable basis.

This study attempts to meet in a satisfactory manner all of these considerations.

The variables used in this study are the following:

Dependent variables:

1. State and local current revenue per pupil. This includes current

revenue for all purposes, including transportation, food services, etc. It excludes revenue for capital outlay and debt service. The intent is to measure the adequacy and equity of the state system of education, which includes the local contributions. Where federal impact aid is included in the state finance system as a local revenue (as in New Mexico), it is also included in this variable. This variable was used in three of the four states; it was unavailable for Connecticut.

2. Total current revenue per pupil. This measures the adequacy and equity of the total system, including federal contributions. Comparison with results for state and local revenue will indicate the extent of improvement (or worsening) in the measures as a result of federal aid. This was used in New Mexico and New Jersey.

3. Current expenditure per pupil. This was used in Connecticut, where the fact of schools being part of the town budget makes revenue data unavailable.

For each of these variables the number of pupils is measured by the average daily membership where available. Where ADM is not available, the most similar measure collected by the state is used.

It might be thought that a variable measuring expenditures would be better than revenues. However, use of such a variable does not allow us to assess adequacy and equity separately for the state-local system and for the system when federal money is added. There is also the question of whether one should use a measure of resources (such as pupil-teacher ratio), or a combined money-resources measure, such as some of those used in the NCES study. The problem here is in getting comparable data. Such data are

apparently available in the ELSEGIS data bank, but this is not for all districts in a state. When ELSEGIS is extended to all districts it would be appropriate to think of such variables. However, one of the reasons for the NCES use of such variables was to try to neutralize certain cost differences. It seems more appropriate instead to introduce appropriate variables into the regression equation to measure these cost differences, rather than trying to neutralize them.

Independent variables:

Variations in wealth and effort:

1. District wealth, measured by equalized assessed valuation per pupil. Most states now attempt to equalize assessed valuations for school finance purposes, although some do a poor job of it, and these data are readily available. It might be desirable to have some measure of per capita or family income as well, but such data are not available on a school district level in most states. In those states where they are available, they are usually for 1969, the date of the last federal census.

2. District tax effort, measured by equalized tax rate. This is the tax rate, based on equalized assessed valuation, that would raise the amount of local current tax revenue received by the district.

Variations in educational need:

1. Proportion of students eligible for special education in the district. There are currently substantial variations in the definition of special education among the states. It includes categories of mentally retarded, physically handicapped, emotionally handicapped, and gifted. However, it seems probable that operation of the federal Education for All Handicapped

law will produce, in the near future, data that are comparable across states, and from one year to another. For now, we use whatever data are available. No attempt is made to distinguish among handicapping categories, since these differ from state to state. When the data spawned by the federal law become available, it may be possible to use several variables here, one for each kind of handicap.

2. Proportion of pupils eligible for compensatory education. This is measured as the proportion of Title I eligible pupils in the district. This is potentially available on a uniform basis for all states.

3. Proportion of pupils eligible for bilingual education. This is not currently available on a uniform basis in all states, but operation of federal laws regarding bilingual education may soon make such data available. For now, the best approximation available is used.

Variations in cost:

1. A measure of smallness of school district. If the district has fewer than 500 pupils, the value of the variable is the 500 minus number of pupils. If it has more than 500 pupils, the value of the variable is zero. This is based on an arbitrary choice of 500 as the level below which diseconomies of scale occur.

2. A measure of largeness of school district. If the district has more than 10,000 pupils, the value of the variable is the number of pupils minus 10,000; if it has fewer than 10,000, the value of the variable is zero. This variable reflects the fact that large school districts usually have high revenue and expenditure per pupil, presumably reflecting higher costs in city school districts. The choice of 10,000 is arbitrary.

Note that most school districts with high per-pupil transportation costs will be small districts. Although it might be desirable to have some variable that more directly measures need for transportation services, none is available on a comparable basis for more than a few states. The "smallness" variable will probably capture most of this variation.

It might also be desirable to introduce a variable other than district size that more directly measures variations in the cost of producing equivalent educational services. However, cost indices are still in the process of development, and no data are available.

It should also be noted that there is one area where states often provide extra money that has specifically not been included in these variables. That is a measure of the proportion of vocational pupils. The reason is that this variable, unlike all of the others, is substantially under the control of the school district. While this may be thought of as a type of special need, there is at present no way of measuring it that is free of district decisions as to how much vocational education to offer.

THE MEASURES

The variables, discussed above, are the items of data for every school district in the state that constitute the raw material of the analysis. The measures are the statistics that are derived from these analyses. Any multiple regression develops numerous measures: means, standard deviations, regression coefficients, beta weights, standard errors, partial correlations, and others. The task of a project such as this one is to develop measures that are understandable to the intelligent layman. A number of such measures are developed below. It is not the intent that all of these measures need be

simultaneously to analyze the equity of a state's school finance system. The beauty of the multiple regression approach is that one aspect of the state's system can be examined while holding constant the effect of other variables. For example, the degree of wealth equalization could be examined while holding constant the effect of adjustments for handicapped, compensatory, and bilingual students and for extra costs in small and in very large districts.

A multiple regression gives an equation of the form

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 \ldots$$

where Y is the dependent variable, the X's are the independent variables, b_0 is a constant, and the rest of the b's are regression coefficients. The constant is the value of Y that would occur if the values of the independent variables were all zero. It is an artificial value, of course, since at least in the situation we have here there are never negative values for the independent variables, and only the two size variables are apt to be zero.

The regression coefficient for a variable is the amount by which the value of Y increases for an increase of one unit in the independent variable with which the regression coefficient is associated. For example, if the regression coefficient for tax rate were 50, it would mean that an increase of 1 mill in the tax rate would be associated with an increase of $50 dollars in state and local revenue per student, assuming that all other variables were held constant.

The coefficient of determination is usually called R^2. It is the square of the multiple correlation coefficient, and indicates the amount

of variation in the dependent variable that is explained by variation in the independent variables. For example, an R^2 of .50 would indicate that 50% of the variation in revenues was associated with, or could be explained by, variations in the independent variables measuring wealth, tax rate, needs, and costs. The other 50% of the variation would be unexplained. It might be the result of variables that are important but unmeasured, or it might simply be random variation.

These statistical measures are used in various ways to produce the measures of equity and adequacy that are described below.

Measures of the Relative Importance of Wealth, Tax Rate, and Provision for Needs and Costs

These measures give an indication of the extent to which the variation in revenues per student is related to variations in wealth, in tax rate, or the existence of special needs and costs. They are the following four measures:

1. Wealth Contribution. This is the percentage of the total variation in revenue per student (or of either of the other two dependent variables) that is uniquely associated with differences in wealth. It is mathematically the difference in R^2 of the regression with all variables in it. and the regression with all variables except wealth.

2. Tax Rate Contribution. This is the percentage of total variation in revenue per student uniquely associated with variations in tax rate. It is the difference in R^2 of the regression with all variables and the regression with all variables but tax rate.

3. Needs and Costs Contribution. This is the percentage of total

variation in revenue per student uniquely associated with variations in the needs and costs measured in the regression: proportions of compensatory, handicapped and bilingual, and size of district if it is smaller than 500 or larger than 10,000. This is determined similarly to the wealth and tax rate contributions. The R^2 for the regression with only wealth and tax rate is subtracted from the R^2 for the regression with all of the variables.

4. Unexplained Variation. This is simply 100% minus the three percentages calculated above. Mathematically, it consists of the percentage of variation unexplained by the variables in the complete regression, plus any variation explained by two or more of the variables in common.[18]

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[18] There are several ways in which one might attempt through multiple regression to separate the effects of wealth, tax rate, and needs and costs from each other. One way is to utilize the following identity:

$$\beta_1 r_{y1} + \beta_2 r_{y2} + \ldots + \beta_n r_{yn} = R^2$$

That is, the sum of the products of the beta weights (standardized regression coefficients) and the correlation of the associated variable with the dependent variable is equal to the coefficient of determination. Since each term contains quantities associated with only one of the variables in the regression, the term can be thought of as the total contribution of that variable to the explanation of variation in the dependent variable. Conceptually, this is a clean-cut way of proceeding. The trouble is that in practice one occasionally finds "suppression variables." These are variables which have a low correlation with the dependent variable, but a higher correlation with one of the other independent variables. The usual result is a regression coefficient with a sign opposite that of the simple correlation between the variable and the dependent variable. This naturally results in a β-r product that is negative. A negative contribution to explanation of variance is, to say the least, difficult to explain. More information on the action of such suppression variables can be obtained from Walter Garms, "The Suppression Variable in Multiple Regression," unpublished, 1968.

A similar problem arises with the use of a different concept. In this one, essentially the provision for special needs and costs is set aside, and provision for normal students is examined to determine the percentage of it that is dependent upon wealth, the percentage dependent upon tax rate, and

(footnote continued next page)

the percentage that is neutral (that is, independent of both wealth and tax rate). The average provision for normal students is determined by summing the constant in the regression equation, the product of the regression coefficient for wealth times the average wealth, and the regression coefficient for tax rate times the average tax rate. In symbols, this is

$$\text{Average provision for normal students} = b_0 + b_1\bar{X}_1 + b_2\bar{X}_2$$

Then the percentage of that provision that is associated with wealth is $b_1\bar{X}_1$ divided by the average provision and multiplied by 100, the percentage associated with tax rate is $b_2\bar{X}_2$ divided by the average provision and multiplied by 100, and the percentage that is neutral is b_0 divided by the average provision and multiplied by 100. The fact that the average wealth and the average tax rate are always positive, whereas the beta weights may be negative, means that the percentage associated with wealth or tax rate may be negative. In addition, it is possible for the constant to be negative, so that the percentage that is neutral may also be negative. Again, there is great difficulty in trying to interpret such negative percentages.

The method selected has the advantage that it is impossible for the unique contribution of a variable, as measured here, to be negative. It is possible for the common contributions to be negative. In general, these common contributions tend to be small, compared with the unique contributions, and the most satisfactory thing to do seems to be to include them with the unexplained variation. When this procedure is followed, it is impossible for any of the percentages to be negative. In addition, the interpretation appears to be relatively straightforward.

These four measures, used together, give valuable insights into the type of school finance system operated by the state. Although other measures are developed and described below, these could well be used by themselves as a way of comparing school finance systems. For idealized examples, refer to Table II-1. If there were full state assumption of school costs, with a rational basis for distributing money that included only differences in needs and costs and allowed no variation in expenditures to result from differences in wealth and tax rate, the result would be as in the first line of the table. All of the variation in expenditures (or revenues) would be explained by differences in needs and costs. Of course, this is idealized.

TABLE II-1

Examples of Contributions of Factors in Different Systems

	Percentage Contribution of			
	Wealth	Tax Rate	Needs and Costs	Unexplained
Full state assumption	0	0	100	0
Fully power equalized, no needs and costs allowance	0	100	0	0
Foundation program with unequalized taxes above, no needs and costs	High	Moderate	0	Moderate
Revenue limits, squeezed from previous levels toward equality, no needs and costs	Low	Low	0	High
Flat grant, no needs and costs	High	Moderate	0	Moderate
Big categorical programs, no wealth equalization	High	Moderate	High	0
Capricious	Low	Low	Low	High

In actual practice the state might make allowance for needs and costs that are not recognized in the variables measured here. Or it might make allowance for some needs and costs on a nonlinear scale. The result, if not correlated with wealth or tax rate, would be some unexplained variation. If, as is likely, there was some incidental correlation of these allowances with wealth or tax rate, there might also be some small contribution from one or both of them. However, the basic shape of the system would show through clearly.

In a wealth neutral system, the situation would be as shown in the second line of the table. This is one where recapture makes the system completely wealth equalized, and in which there is no allowance for special needs and costs. All of the variation would be explained by variations in tax rate, and none by variations in wealth.

The typical foundation program is shown in the third line. Such a foundation program provides a guaranteed minimum revenue per pupil, but rich districts raise more than the guarantee with the required tax rate. In addition, most districts levy unequalized taxes above the required rate. In this case, the contribution of wealth would be high, that of tax rate moderate, and that which is unexplained moderate.

A system in which there are revenue limits is shown in the next line. The assumption is that the limits were initiated based on previous revenue levels (which were strongly related to wealth and tax rate), but that over time they have been squeezed toward revenue equality. There is a remaining relationship with wealth and tax rate, but it is low. Unexplained variation is high.

A flat grant does little to equalize, and the major effect, in comparison with a completely unequalized system, would be to increase the unexplained variation.

A state which made no attempt at wealth equalization but had large categorical programs for special needs and costs would have a profile like that in the sixth line of the table.

Finally, a state in which the distribution of money is capricious is shown in the last line of the table. This might be the case if the major state distributions were based on criteria that had nothing to do with needs or costs.

These factors, then, are very helpful in understanding the type of school finance program operated by the state. We shall see later, when data for four states are examined, that these measures show wide variation among the states, and are extremely helpful in categorizing those states. Just what one would choose as an ideal configuration of these factors would depend upon his values. However, those who favor expenditure equality would presumably favor something approaching the situation shown in the first line of the table. Those favoring power equalizing would probably favor the situation shown in the second line, with greater or lesser contribution from needs and costs depending upon the importance they attach to this compared with fiscal neutrality.

Measures of the Adequacy and Degree of Dispersion of the Total System

There are two measures here, and they are not remarkable in any way. Rather, they have been used frequently by other investigators.

1. Average Revenue per Student. This is simply the total current revenue from state and local sources in the state, divided by the total number of students. (Of course, one could use total current revenue from all sources, or total current expenditures, instead.) The actual method of calculation is to calculate the average revenue per pupil for each district and construct an average weighted by the number of pupils in each district. The result is mathematically the same as taking total revenue divided by total students. This measure has been used to compare states for many years, and the problems with using it are well documented. The major problem is in mixing revenues intended for special needs and costs with those intended for normal students. Interstate comparisons are impeded by the differing extent to which states take this into account. In addition, there is the general difference in cost of education among states to confound the issue. Nevertheless, this measure deserves inclusion as the best available measure of the general adequacy of the educational program of a state. This measure, deflated by an appropriate cost index, would be even better, but such an index does not exist.

2. Dispersion of Average Revenue per Student. This measure is the coefficient of variation of state and local revenue per student, which is defined as the standard deviation of state and local revenue divided by its average. It has the property that approximately 2/3 of the values for the districts will fall within plus or minus that proportion of the mean. For example, if the mean of state and local revenue is $1000, and the coefficient of variation is .20, the 2/3 of the pupils will reside in districts that have state and local revenues between plus and minus .20 times $1000, or

between $800 and $1200. Obviously, if there were absolute equality of state and local revenues, the value of the coefficient of variation would be zero. The larger it is, the greater the inequality in revenues. This measure has also been used to compare revenue distributions. It too suffers from the confounding of provision for needs and costs with provision for normal students. For example, if there were two states with identical student populations, one with absolute equality of revenues per student and the other with differences resulting from a wise and equitable program of caring for differences in needs and costs, the one that did not make allowance for differences in needs and costs would be the state with the greater equalization according to this measure.

Measures of Provision for Normal Students and for Needs and Costs

These measures look at parts of the system, disaggregated. The disaggregation is done statistically, through the multiple regression process. The measures are as follows:

1. Revenue for Normal Students. This is the average revenue for normal students, those without special needs (compensatory, handicapped, or bilingual) or costs (associated with small or large districts). It assumes that the regression coefficients for the variables measuring needs and costs measure the additional money for these purposes, and that all of the rest of the money is for normal students. Mathematically, it is calculated by multiplying the regression coefficient for wealth (in the regression containing all of the variables) by the average wealth, adding to this the regression coefficient for tax rate times the average tax rate, and adding in the constant for the equation. In other words, the formula is

Revenue for normal students = $b_0 + b_1\overline{X}_1 + b_2\overline{X}_2$

where b_0 is the constant, b_1 and b_2 are the regression coefficients for wealth and tax rate respectively, and $\overline{X}_1$ and $\overline{X}_2$ are the average wealth and average tax rate.

2. Additional Weighting for Compensatory Students. The additional revenue per student for compensatory students is given by the value of the regression coefficient for the variable Proportion of Compensatory Students. Rather than display this amount, I have chosen to show the proportion that this is of the revenue for normal students. This is equivalent to the weighting that would be attached to compensatory students if the state had a comprehensive weighting program. If the weighting is .50 in a state that has an average revenue for normal students of $1000, this means an additional $500 in revenue is received on the average for each compensatory student. Note that many states with weighting schemes would call this weight 1.50 rather than .50, combining the weighting for a normal student with that for the compensatory student. The weighting given here is a weighting in addition to the amount for normal students.

3. Additional Weighting for Handicapped Students. This is calculated like the weight for compensatory students from the regression coefficient for handicapped students.

4. Additional Weighting for Bilingual Students. This is calculated from the regression coefficient for bilingual students.

5. Additional Weighting for Small Schools. The amount of additional money for districts with small schools is calculated as the additional dollars per student for each 100 students the district size is less than 500. For

example, if the amount is $50, this means that a district with 400 students receives $50 more per student than a district with 500 students, other things being equal. A district with 300 students receives $100 more, one with 200 students receives $150 more, and one with 100 students receives $200 more per student. The amount is calculated as 100 times the value of the regression coefficient for small schools, and is then expressed as a proportion of the revenue for normal students. Of course it is recognized that the formal mechanism (if it exists in the state formula) for allowing for small districts may not be linear in the way expressed here, but this is an approximation of the effect of actual distributions.

6. Additional Weighting for Large Districts. This is calculated similarly to the one above. It is the additional amount per student associated with each 1,000 students above a district ADM of 10,000. For example, if this amount were $10, it would mean that a district with an enrollment of 20,000 would receive on the average an additional $100 per student $(\frac{20,000 - 10,000}{1,000} \times \$10)$. This also is expressed as a proportion of the revenue for normal students.

We thus have four measures of the relative importance of wealth, tax rate, and provision for needs and costs, two of the adequacy and degree of dispersion of the total system, and six measures of provision for normal students and for needs and costs. These measures can be used singly or in combination, providing a more or less complete picture depending upon the interests of the analyst.

While the multiple regression method of analyzing the equity of school finance systems is better in several ways than the simple univariate or

bivariate measures that have been proposed so far by others, it suffers from two problems, one practical and the other technical. The practical one is that the idea of multiple regression may be too complicated for the layman to understand, and therefore the method may be rejected. I believe this problem can be overcome, and it has been attacked in a separate chapter.

The technical problem is that when independent variables are highly correlated with each other, there is no known way of completely separating the effects of one from the other. The effect of such high correlations is to make the regression coefficients unstable. In the case of two highly correlated independent variables, both of which would have been expected to receive moderate positive regression coefficients, one may actually receive a higher positive coefficient than expected, and the other receive a negative coefficient. This means that regressions with highly correlated independent variables must be looked at with a degree of skepticism.

Those who have written on the subject usually suggest that correlations between independent variables that are higher than 0.5 (indicating that 25% of the variation in one is associated with variation in the other) are apt to cause trouble. I have thus been careful to examine the correlation matrices for each of the regressions I have done. Ideally, one would like a matrix in which each of the independent variables has a low correlation with every other independent variable. The correlations with the dependent variable are unimportant for the problem being discussed here.

A typical correlation matrix is displayed in Table II-2, and it will illustrate the problem. Lines have been drawn to separate the independent variables from the dependent variable, and the groups of independent variables

TABLE II-2

Correlation Matrix for Illinois Unit Districts, 1974-75

(Pupil Basis)

	Revenue	Wealth	Tax Rate	Comp Ed	Special Ed	Bilingual Ed	Small	Large
Revenue	1.00							
Wealth	.73	1.00						
Tax Rate	.41	-.16	1.00					
Comp Ed	.22	-.03	.34	1.00				
Special Ed	.12	.05	.09	-.11	1.00			
Bilingual Ed	.37	.08	.48	.77	-.07	1.00		
Small	.15	.20	-.05	-.09	.04	-.13	1.00	
Large	.35	.11	.40	.86	-.18	.93	-.11	1.00

~~Table II-3 gives a summary of the measures that have been discussed above.~~

from each other. It will be noted that the correlations between wealth and the other independent variables (in the column labelled Wealth) are all substantially less than 0.5. Similarly, the correlations between Tax Rate and the other independent variables (column labelled Tax Rate) are all less than 0.5, although one is close to that figure, at 0.48. However, there are three correlations among the variables measuring needs and costs that are greater than 0.5. It appears that the bilingual and compensatory students are overwhelmingly in large districts. This may be a Chicago effect, since using the pupil as the unit of analysis puts a weight on Chicago data commensurate with its ADM. This means that we must be skeptical about the weightings for compensatory education, bilingual, and large districts. However, the lack of high correlations between the needs and costs variables and either wealth or tax rate means that we can have considerable confidence in the measures that compare the percentage of variance uniquely associated with each of these groups of variables. The reason, of course, is that in these measures, needs and costs are treated together as a single concept.

In each of the states to be discussed later, cautions which should be observed in interpreting the data will be discussed, based on the correlation matrix. The matrix itself will be given in Appendix C, along with the average values of the variables (Appendix B).

Table II-3 gives a summary of the measures that have been discussed above.

TABLE II-3

The Measures of Adequacy and Equity

Description	Definition*
Measures of Relative Importance of Factors	
1. Wealth Contribution	$(R^2_{All} - R^2_{y234567}) \times 100$
2. Tax Rate Contribution	$(R^2_{All} - R^2_{y134567}) \times 100$
3. Needs and Costs Contribution	$(R^2_{All} - R^2_{y12}) \times 100$
4. Unexplained variation	100 - sum of above
Measures of Adequacy and Dispersion of the Total System	
1. Average Revenue per Student	$\overline{Y}$
2. Dispersion of Average Revenue per Student	$\frac{\sigma Y}{\overline{Y}}$
Measures of Provision for Normal Students and for Needs and Costs	
1. Revenue for Normal Students (Referred to below as "Normal")	$b_0 = b_b\overline{X}_1 + b_2\overline{X}_2$
2. Additional Weighting for Compensatory Students	$\frac{b_3}{\text{Normal}}$
3. Additional Weighting for Handicapped Students	$\frac{b_4}{\text{Normal}}$
4. Additional Weighting for Bilingual Students	$\frac{b_5}{\text{Normal}}$
5. Additional Weighting for Small Districts	$\frac{100 \times b_6}{\text{Normal}}$
6. Additional Weighting for Large Districts	$\frac{1000 \times b_7}{\text{Normal}}$

*The symbols used have the following meanings:

R^2 is the coefficient of determination for the regression equation.

R^2_{y12} is the coefficient for the equation with the dependent variable (y) and independent variables 1 and 2. The variables are numbered as follows:

(Footnote to Table II-3 continued)

1. Wealth
2. Tax Rate
3. Compensatory Ed
4. Special Ed
5. Bilingual Ed
6. Small District
7. Large District

$\overline{Y}$ is the mean of the dependent variable Y (state-local revenue per ADM, total revenue per ADM, or current expenditures per ADM, depending upon the analysis).

σY is the standard deviation of the dependent variable.

$\overline{X}_1$ is the mean of the first independent variable (wealth), etc.

b_0 is the constant of the regression equation.

b_1 is the regression coefficient for the first independent variable (wealth), etc.

"Norm[illegible]," as noted in the table, refers to $b_0 + b_1\overline{X}_1 + b_2\overline{X}_2$.

CHAPTER III

ANALYSIS OF DATA

I was fortunate in having data provided to me on four states for which it was possible to get data on all of the variables. Robert Brischetto provided data on New Mexico, Margaret Goertz on New Jersey and Connecticut, and Alan Hickrod on Illinois. The selection of states is fortunate, for each displays a different pattern. Complete data on the mean values for the variables, correlation matrices, and values for the various measures are given in an appendix. The discussion here will use the measures to compare school finance systems among states and over time within a state.

A total of 24 separate analyses was possible from the data furnished. It was possible to do the analysis using either the district or the pupil as the unit of analysis, and there were 12 analyses using each, consisting of the following:

Connecticut: Current expenditures per ADM for 1975-76

Illinois: State-local current revenue per ADM for 1974-75 for elementary districts, for secondary districts, and for unit districts.

New Jersey: State-local current revenue per ADM for 1975-76 and 1976-77
Total current revenue per ADM for 1975-76 and 1976-77

New Mexico: State-local current revenue per ADM for 1974-75 and 1975-76
Total current revenue per ADM for 1974-75 and 1975-76

I believe that analyses using the pupil as the unit of analysis are the most meaningful, and only passing reference will be made to the analyses using

the district as the unit. Complete data using the district as the unit can be found in the appendix.

First, it is instructive to compare the mean values of the variables for the states. The values are given in Table III-1. (All values given in the ensuing discussion are for analyses using the pupil as the unit of analysis unless otherwise specified.)[19]

Only data on current expenditures are available for Connecticut because the fact that the schools are an integral part of the town government makes segregation of revenues for schools alone impossible. The average revenues are highest in New Jersey and lowest in New Mexico, as might be expected. It is interesting that revenues for unit districts in Illinois are lower than those for either elementary or secondary districts, and this is closely related to the fact that wealth is higher and tax rates lower in elementary and secondary districts than in unit districts. It is clear that the separate elementary and secondary districts continue to exist because many of them are islands of wealth. Tax rates tend to be in a similar range for Connecticut, Illinois, and New Jersey, but are lower by an order of magnitude for New Mexico, reflecting their traditional reliance on heavy state financing of the schools.

There is, of course, doubt that the data on number of compensatory, handicapped, and bilingual pupils has been gathered on a comparable basis in the various states. As stated earlier, these variables were defined because they are important categories of need and because there exists the

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[19]Tables of basic data, including those in which the district is the unit of analysis, are given in Appendix B.

TABLE III-1

Mean Values of the Variables

	Connecticut 1975-76	Illinois 1974-75 Elementary	Illinois 1974-75 Secondary	Illinois 1974-75 Unit
Current Expend/ADM	$1467	-----	-----	-----
State-Local Rev/ADM	-----	$1279	$1649	$1254
Total Rev/ADM	-----	-----	-----	-----
Wealth: EAV or ENGL/ADM*	$84,179	$42,134	$77,485	$26,478
Tax Rate: Mills	12.7	19.8	17.6	27.4
Percentage of Comp Ed	12.2%	8.1%	6.1%	27.6%
Percentage of Handicapped	2.0%	13.7%	6.6%	10.0%
Percentage of Bilingual	4.4%	4.9%	2.6%	8.4%
% of Pupils in Small Dists	1.2%	9.3%	2.3%	2.7%
% of Pupils in Large Dists	37.0%	5.5%	15.3%	52.3%

	New Jersey 1975-76	New Jersey 1976-77	New Mexico 1974-75	New Mexico 1975-76
Current Expend/ADM	-----	-----	-----	-----
State-Local Rev/ADM	$1511	$1668	$948	$1070
Total Rev/ADM	$1523	$1680	$1059	$1211
Wealth: EAV/ADM	$67,021	$72,876	$57,309	$64,116
Tax Rate: Mills	18.9	15.8	1.2	1.1
Percentage of Comp Ed	14.5%	24.5%	6.0%	8.0%
Percentage of Handicapped	2.1%	2.0%	2.1%	1.9%
Percentage of Bilingual	1.4%	1.9%	1.0%	1.7%
% of Pupils in Small Dists	2.5%	2.6%	2.8%	2.8%
% of Pupils in Large Dists	27.1%	25.6%	44.6%	44.4%

*Equalized Net Grand List (ENGL) in Connecticut; Equalized Assessed Valuation (EAV) in the other states.

potential for data gathering on a consistent basis among states as a result of federal action, even though the data are not consistent now. Data were used as they were provided to me. They undoubtedly reflect the actual number of pupils enrolled in special programs, rather than those who might qualify if sufficient programs existed. It should be noted that the percentage of compensatory pupils in New Mexico is lower than in the other three states, and that this probably reflects a lack of programs for them. On the other hand, the small number in the elementary and secondary districts in Illinois, and the large percentage in the unit districts probably reflects actual population distributions, since the same programs would exist for all three types of districts.

The percentage of handicapped is about 2% in Connecticut, New Jersey, and New Mexico, but is three to six times as high in Illinois. This probably is a difference in the definition of who is handicapped or in the method of counting them. The percentage of bilingual is relatively small in all of the states, but it is hard to believe that it is as low as shown for New Mexico. Again, it probably reflects a lack of bilingual programs rather than of bilingual children.

The data on percentage of pupils in small and large districts is consistent across states, since it is derived directly from some of our most reliable data: the number of pupils in each district. Of course, the definition of a small district (fewer than 500 pupils) and a large district (over 10,000 pupils) is arbitrary, but it is consistent. It is interesting that New Mexico has a greater percentage of its pupils in large districts than any other except the unit districts in Illinois. This

is because of the small number of districts in New Mexico (88), and the concentration of population in Albuquerque. The high percentage for unit districts in Illinois is undoubtedly due in large part to Chicago. New Jersey, while it is a highly urbanized state, has so many districts that few of them have more than 10,000 pupils.

Relationship of Revenue Variation to Wealth, Tax Rate, Needs and Costs

What are the characteristics of the school finance systems of these four states? Table III-2 gives data for the percentage of variation in state-local revenue (current expenditures in Connecticut) attributable to wealth, to tax rate, to needs and costs, and unexplained, for 1974-75 in Illinois (unit districts) and New Mexico, and for 1975-76 in Connecticut and New Jersey. The choice of only a single year and of only state-local revenue for this table is to keep it sufficiently simple that its message can easily be grasped.[20]

More than half of the variation in current expenditures per pupil in Connecticut is explained by the unique contributions of wealth, tax rate, and needs and costs. Connecticut is shown by these contributions to be a state in which wealth is a very important determinant of expenditures. This, of course, is what Horton v. Meskill was about. Tax rates are of considerably less importance in determining Connecticut expenditures. On the other hand, needs and costs contribute substantially to explanation of variation. Comparing the Connecticut configuration with Table II-1, it

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[20]Tables of all of the measures for each state, using both pupil and district as the unit of analysis, are in Appendix A.

TABLE III-2

Measures of the Relative Importance of Factors[1]

	Connecticut 1975-76	Illinois[2] 1974-75	New Jersey 1975-76	New Mexico 1974-75
Wealth Contribution	31%	52%	8%	18%
Tax Rate Contribution	7%	18%	13%	3%
Needs and Costs Contribution	16%	1%	5%	38%
Unexplained Variation	46%	29%	74%	41%

[1]Current expenditures per pupil in Connecticut, state-local current revenue per ADM in other states. The pupil is the unit of analysis.

[2]Unit districts.

fits the pattern of foundation or flat grant, but with substantial provision for needs and costs. Indeed, the main features of the Connecticut system are a flat grant of $250 per ADM and large categorical programs in each of the three needs categories. Thus Connecticut is a state that has done quite a bit in providing for needs and costs, but has done little in wealth equalization.

Illinois is a state in which over 70% of the variation in state-local revenue per ADM is explained by the three factors, and the result is not pleasing to those interested in equalization. Most of the explained variation is the result of differences in wealth, with the remainder resulting from differences in tax rate. There seems to be almost no variation explained by differences in needs and costs. The pattern in Illinois is similar to that for the usual foundation program shown in Table II-1.

The striking thing about New Jersey is that neither wealth, tax rate, nor needs and costs explain much of the variation in state-local revenues. Three-quarters of the variation is unexplained, and is therefore resulting from unmeasured variables or is random variation. The pattern is similar to that in the last line of Table II-1. Unless it can be shown that the variation is the result of an unmeasured variable that is important in terms of equity, it would have to be said that the New Jersey system in 1975-76 was inequitable because of the chaotic and random operation of the system, rather than because it is closely connected to differences in wealth. Note, as a matter of fact, that the differences that are explained are mainly the result of differences in tax rate.

Finally, New Mexico is an example of a state in which differences in

wealth are not very important, differences in tax rate are insignificant in their effect on revenue, and differences in needs and costs are very important. The pattern is most like that of the first line of Table II-1. These four states, then, are very different, and the measures have helped us to understand the ways in which they are different.

Table III-3 shows that the results for Illinois are not confined to the unit districts, but are similar for all three types of districts.

Table III-4 compares the results for New Jersey and New Mexico in two different years ("pre-reform" and "post-reform"). It is clear that there has been a change in both states, but it is not clear whether the change can be called a reform, rather than an evolution. In any case, the system in New Jersey post-reform has less random or unexplained variation, and twice as much of the variation is explained by tax rate differences. It appears from this that New Jersey is headed (however slowly) in the direction of a power equalized system. In New Mexico, on the other hand, variation resulting from differences in both wealth and tax rate has been reduced, while that explained by differences in needs and costs has increased. It appears that New Mexico has developed a system that is highly equalized in terms of expenditures on normal students, and which puts a heavy emphasis on taking care of differences in needs and costs. The relatively large unexplained variation may result from the provision in the state aid system that takes into consideration the training and experience of the teachers of a district. On the surface, this would appear to be a very equitable system (teacher training and experience provisions aside), but that depends upon the extent to which each of the needs or costs is compensated for, and the values one brings to bear. This will be explored later.

TABLE III-3

Relative Importance of Factors in Illinois Districts, 1974-75, State-Local Revenue per ADM

	Elementary	Secondary	Unit
Wealth Contribution	60%	52%	52%
Tax Rate Contribution	17%	34%	18%
Needs and Costs Contribution	1%	1%	1%
Unexplained Variation	23%	12%	29%

TABLE III-4

Relative Importance of Factors in Two Different Years, State-Local Revenue per ADM

	New Jersey		New Mexico	
	1975-76	1975-77	1974-75	1975-76
Wealth Contribution	8%	10%	18%	11%
Tax Rate Contribution	13%	26%	3%	1%
Needs and Costs Contribution	5%	1%	38%	46%
Unexplained Variation	74%	63%	41%	44%

Table III-5 shows differences in the relative importance of the factors when looking at total revenue rather than state-local revenue. It is a way of assessing the extent to which the federal revenues, when added to the state-local revenues, are more equalizing or less equalizing. One would expect that most federal programs would contribute money that would show up in the needs and costs portion, for they would be the results of categorical programs such as ESEA Title I. However, the impact aid money and Johnson-O'Malley money (for Indian students) is general aid, and would presumably show up as changing the wealth or tax rate contributions. Whether the net effect will be more or less equalization is an empirical question that depends upon the characteristics of the districts that receive large amounts of this money.

The effects in New Mexico are about as discussed above. The federal money puts even more emphasis on needs and costs than the state-local money did, particularly in 1974-75. It is very interesting that it also has the effect of reducing still further the already small reliance on differences in district wealth in New Mexico. (Note that federal impact aid is included in state-local revenue in New Mexico.)

The effect in New Jersey is negligible. The reason for this is seen when we note from the appendix tables that the average amount of total revenues is only greater than state-local revenues by $12 per pupil in both years. By comparison, in New Mexico federal revenues are $111 per pupil in 1974-75, and $141 per pupil in 1975-76.

In examining the wealth, tax rate, and needs and costs contributions, we should be concerned that the correlations among the groups of independent

TABLE III-5

Relative Importance of Factors for State-Local and Total Revenue

New Mexico

	1974-75		1975-76	
	State-Local	Total	State-Local	Total
Wealth Contribution	18%	6%	11%	1%
Tax Rate Contribution	3%	0%	1%	1%
Needs and Costs Contribution	38%	43%	43%	44%
Unexplained Variation	41%	51%	44%	54%

New Jersey

	1975-76		1976-77	
	State-Local	Total	State-Local	Total
Wealth Contribution	8%	7%	10%	10%
Tax Rate Contribution	13%	11%	26%	26%
Needs and Costs Contribution	5%	6%	1%	1%
Unexplained Variation	74%	76%	63%	62%

variables are not too high, as discussed earlier (see the discussion accompanying Table II-2). Inspection of the correlation matrices reveals the following:

1. In Connecticut there is a correlation of -.70 between wealth and tax rate. This may mean that we cannot be as certain as we would like to be of the size of the wealth and tax rate contributions. Because wealth is more highly correlated with current expenditures than is tax rate, the effect of this high correlation between wealth and tax rate would be to overstate the contribution of wealth and understate the contribution of tax rate. There should be no confusion with needs and costs, for although there are high correlations among the needs and costs variables, none of them is highly correlated with wealth or tax rate.

2. In Illinois none of the correlations between groups of variables is as high as .50. The highest is .48 between tax rate and bilingual ed for unit districts. One would anticipate no problems of interpretation of the contributions in Illinois.

3. Similarly, in New Jersey there are no high correlations to interfere with interpretation in either year.

4. In New Mexico there should also be no problem of interpretation. The highest correlation is -.48 between wealth and tax rate in 1975-76

Average Revenue and Its Dispersion

Table III-6 gives measures for all four of the states for the years available, and for the categories of revenue or expenditure available. The average provision has already been discussed. It is high in Connecticut and New Jersey,

TABLE III-6

Average and Dispersion of Revenues and Expenditures

	Average	Coefficient of Variation
Connecticut, 1975-76		
Current Expenditures	$1467	.17
Illinois, 1974-75		
State-Local Revenue		
Elementary	$1279	.26
Secondary	$1649	.21
Unit	$1254	.13
New Jersey		
State-Local Revenue		
1975-76	$1511	.19
1976-77	$1668	.17
Total Revenue		
1975-76	$1523	.19
1976-77	$1680	.16
New Mexico		
State-Local Revenue		
1974-75	$948	.17
1975-76	$1070	.14
Total Revenue		
1974-75	$1059	.20
1975-76	$1211	.18

lower in Illinois, and lowest in New Mexico. This is interesting information, but it is difficult to interpret it without better knowledge than we currently have on differences in the cost of providing equivalent educational services in the four states. Of more interest is the coefficient of variation. It is highest in Illinois elementary districts, and lowest in Illinois unit districts. Does this mean that Illinois elementary districts are the least equalized of the four states and the years covered, and that conversely, Illinois unit districts are the most equalized? This is the message that the use of this univariate measure, much touted by those who have attempted to measure school finance equity, brings to us. Yet we have seen from the analysis of the contributions of factors that Illinois districts, whether elementary, secondary, or unit, are the least equalized of those examined. As Table III-3 shows, over half of the variation in revenue of Illinois districts is uniquely related to wealth. Over 70% of the variation in revenue is related either to wealth or tax rate. Almost none of it is related to differences in needs and costs. The low coefficient of variation for unit districts is probably related to the fact that almost half of the ADM (about 500,000 out of 1.2 million) is in Chicago, and all Chicago students are assigned the same revenue.

Similarly, we should note that the coefficient of variation in New Mexico is higher for total revenue than it is for state-local revenue, although the analysis of factor contributions shows that total revenue is more equalized in New Mexico (as regards wealth, that is) than is state-local revenue. This is probably because the federal money goes mainly to take care of differences in needs and costs, increasing the degree of dispersion of revenue that is uncorrected for this. This appears to be a

beautiful case of the problem of looking only at state-local or total revenues without attempting to correct for needs and costs.

Finally, we note that Connecticut, which is conceded to have one of the least equalized systems, has a coefficient of variation similar to that for New Mexico. From all of this, we conclude that these two measures, average revenue and coefficient or variation of it, are not very useful, and often misleading.

Measures of Provision for Normal Students and Needs and Costs

Next, we proceed to the final group of measures. Table III-7 shows measures for the four states, for the various categories of data available. The measures make fascinating reading. First, compare the provision for normal students with that for all students. Note that since there is no correlation as high as .50 between the variables used in calculating the values for normal students and those for special needs and costs in any of these states, we can have considerable confidence in this value for normal students. In Connecticut, provision for normal students is 90% of provision for all students combined. Thus, 10% of the current expenditures is being spent for special needs and costs (or is at least associated with districts that have those special needs and costs). In Illinois, provision for normal students runs from 96% (unit and secondary districts) to 99% (elementary districts) of provision for all students combined. This implies considerably less commitment to providing for needs and costs than in Connecticut, which was borne out by the analysis of factor contributions. In New Jersey, provision for normal students is 1% to 3% higher for normal students than for all students combined! This implies that the New Jersey system is actually

TABLE III-7

Provision for Normal Students, and for Special Needs and Costs

	Connecticut 1975-76	Illinois, 1974-75 Elementary	Secondary	Unit
Average Rev or Exp, $/ADM	$1467	$1279	$1649	$1254
For Normal Students, $/ADM	$1323	$1271	$1590	$1203
Implied Weightings for Needs and Costs:				
Compensatory Ed	-.34	.15	.28	.03
Special Ed	2.70	-.09	.30	.22
Bilingual Ed	-.24	.22	.09	.04
Small Districts, for each 100 below 500	.04	-.01	-.01	.01
Large Districts, for each 1000 over 10,000	.02	-.01	-.00*	.00*

	New Jersey State-Local Revenue 1975-76	1976-77	Total Revenue 1975-76	1976-77
Average Revenue, $/ADM	$1511	$1668	$1523	$1680
For Normal Students, $/ADM	$1552	$1690	$1558	$1698
Implied Weightings for Needs and Costs:				
Compensatory Ed	-.26	-.05	-.25	-.05
Special Ed	-.49	-.18	-.40	-.27
Bilingual Ed	-.82	-.36	-.81	-.34
Small Districts, for each 100 below 500	-.00*	.02	-.00*	.02
Large Districts, for each 1000 above 10,000	.00*	.00*	.00*	.00*

TABLE III-7 (Cont.)

Provision for Normal Students, and for Special Needs and Costs

	New Mexico			
	State-Local Revenue		Total Revenue	
	1974-75	1975-76	1974-75	1975-76
Average Revenue, $/ADM	$948	$1070	$1059	$1211
For Normal Students, $/ADM	$879	$967	$916	$1067
Implied Weightings for Needs and Costs:				
Compensatory Ed	.74	.52	1.19	.75
Special Ed	-.61	1.15	1.15	1.33
Bilingual Ed	2.82	1.48	5.43	3.07
Small Districts, for each 100 below 500	.25	.24	.25	.24
Large Districts, for each 1000 over 10,000	.00*	.00*	.00*	.00*

*A value of .00 means a value closer to zero than to .01; a value of -.00 means a value closer to zero than to -.01.

channelling money away from districts with special needs and costs. Finally, in New Mexico provision for normal runs 90% to 93% of that for all students when state-local money is analyzed, and drops to 86% to 88% when examining total revenue. This reinforces the impression of New Mexico as a state which makes substantial provision for special needs and costs, and of federal money as mainly categorical money designed for the same purposes.

When we wish to analyze the implied weightings for special needs and costs, we are on much shakier ground, for there are sometimes large correlations among the variables that measure them.[21] Let us again take each state in turn.

In Connecticut there are large correlations (about .9) between Compensatory Ed, Bilingual Ed, and Large Districts. In other words, the minorities overwhelmingly reside in the large cities. To a lesser extent (correlation about .5) special ed students are also concentrated in the large cities. This means that we can have little confidence in the implied weightings for Connecticut, except for that for small districts and perhaps for special ed. Note, though, that Connecticut attempts to do something to help both small and large districts, while neither New Jersey nor Illinois do. This is done mainly through the structure of the GTB formula, which measures district wealth by adjusting taxable value by income.

Turning to Illinois, there are no large intercorrelations among the needs and costs variables for the elementary and secondary districts, so we may have some confidence in the weightings. There are large correlations

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[21]The correlation matrices are in Appendix C.

among comp ed, bilingual, and large districts for unit districts, indicating that here, as in Connecticut, the minorities are concentrated in the large cities. However, there are not large differences in the weightings between unit districts and the other two kinds. In general, the weightings are relatively low, and there is essentially no special provision for large or small districts. There is an interesting negative weighting for special ed in the elementary districts. This does not at all imply that there is some provision in the state law designed to take money away from districts with concentrations of special ed students. Rather, it implies that the complex web of provision for the financing of education has inadvertently provided districts with concentrations of special ed students with less money, other things being equal.

When we come to New Jersey, we find that almost all of the implied weightings are negative. This is consistent with the finding that more is spent on normal students than on all students combined. For reasons that appear to deserve close looking into, the New Jersey school finance system actually penalizes districts with special needs. Note also that there is essentially no help for either small or large districts. While we can have little confidence in the size of the implied weightings (because there are high correlations -- .6 to .7 -- between comp ed, special ed, bilingual ed, and large districts), the fact that they are all negative is clearly significant.

Finally, New Mexico presents some interesting data. There are no large correlations among the variables measuring needs and costs, so we may have some degree of confidence in the results. The weightings tend to be five to ten times as large as the weightings in the other states, which goes along

with the picture of New Mexico as a state that really provides for differences in needs and costs. For comp ed, special ed, and bilingual ed, the three categories of special need, federal aid substantially increases the weightings. The weightings for bilingual ed imply higher expenditures for bilingual programs than any reasonable person would expect. I suspect the trouble is in the small percentage of bilingual students identified. While these may be the only ones in special program, their concentration in a district is probably indicative of many more, and New Mexico may be recognizing this in its formula. In other words, money for the problems associated with bilingual students may flow to districts containing those students even though few are actually in special bilingual programs. Lastly, note the relatively large weighting for small districts. This implies that districts with 400 students receive 25% more than those above 500, districts with 300 students receive 50% more, those with 200 students receive 75% more, and those with 100 students receive 100% more. As a matter of fact, New Mexico in 1974 had a sparsity factor in its formula that provided an additional weighting that scaled from .00 at 4000 students to .15 at zero students, and in addition a weighting that scaled from .00 at 200 students to 1.00 at zero students for small elementary schools and one that scaled from .00 to 2.00 between 200 and zero students in small high schools.[22] Using these factors, a district with 400 students evenly divided between elementary and high school would have an additional weighting of .14, a

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[22]See Jack Leppert, et al., "Pupil Weighting Programs in School Finance Reform," School Finance Reform: A Legislator's Handbook, ed. John J. Callahan and William H. Wilken (Washington, D.C.: National Conference of State Legislatures, 1976), p. 19.

district with 300 students would have a weighting of .89, and one with 200 students would have a weighting of 1.64. On the other hand, if all of the district's students were in elementary schools (that is, if it did not operate a high school), the additional weighting for 400 is .14, for 300 is .39, and for 200 is .64. These two assumptions neatly bracket the weights calculated by the regression.

The Unit of Analysis: Pupil or District?

At present, data are available from states only on a district basis. As a result, many of the statistical calculations that have been made in the past have used the district as the unit of analysis. The principal problem with this is that districts vary so much in size. For example, using the district as the unit of analysis treats a New York district with 100 pupils as being of equal importance with New York City, which has almost 1,000,000 pupils. In only one way does this method have validity. This is if one is interested in how districts behave qua districts.

However, it seems that the logical focus in school finance should be upon the pupil, not the district. What happens in New York City is inherently much more important than what happens in the district with 100 students simply because so many pupils are affected. Since, however, we do not have data on expenditures on individual pupils, it is necessary to use a substitute as the best approach to using the pupil as the unit of analysis. This is to weight the district data by the number of pupils in the district. In effect, means and other measures are calculated by assigning to each pupil in New York City the average expenditure (or whatever is being measured) of the district. The result is that instead of having as many cases as there are

school districts in the state, one has as many cases as there are pupils in the state. However, the assignment of average district values to individual pupils results in some constriction of the dispersion of the data.

In spite of the compromise involved in the use of district average data for the pupils of the district, it seems inherently better for equity purposes than using the district as the unit of analysis. As a consequence, I have concentrated on the analyses using the pupil as the unit. However, I have also done the analyses using the district as the unit, and the results are presented in the appendix. Comparing the results for the two methods, we can make the following comments:

1. The percentage of variation explained by the three factors (wealth, tax rate, and needs and costs) is similar for the two units of analysis. Where the percentage is large using one method, it tends to be large using the other method. However, there are differences in the percentages. For example, using the pupil as the unit of analysis, Illinois shows 50% to 60% explained by wealth differences (depending upon type of district), and 17% to 34% explained by differences in tax rate. Using the district as the unit of analysis, 64% to 74% is explained by wealth differences and 10% to 21% by tax rate differences. Only up to 1% is explained by differences in needs and costs, regardless of the unit of analysis.

2. The average revenue does not vary in any regular way between the units of analysis, but the dispersion does. It is consistently less using the pupil as the unit than with the district as the unit. This is because of the constriction in dispersion caused by assigning all pupils in a district the same average value for revenue, even though undoubtedly different

amounts are spent on them.

3. While the implied weights for needs and costs tend to be somewhat similar in the two methods, there is more variation than with the other measures. In some cases, as a matter of fact, the weight is negative using the district as the unit and positive using the pupil as the unit. That this is true should not cast doubt on the results. These are two different ways of looking at the data, and should not be confused with each other.

In summary, I believe that the pupil as the unit is the most reasonable approach to measuring equity, in spite of its shortcomings.

CHAPTER IV

MEASURING INEQUALITY IN SCHOOL FINANCE: A LAYMAN'S EXPLANATION

(This chapter is designed to stand alone. With the omission of this paragraph, it should serve as an adequate explanation of the measurement concepts involved in this study and the results obtained, for the consumption of the average well-informed layman. Such people would include state department of education personnel, legislative staff, and staff of interest groups.)

In recent years there has been great interest in reforming school finance. In some cases, lawsuits ha e resulted in decisions that a state's school finance system is unconstitutional (examples include Connecticut, New York, New Jersey, and California). In other states, such as Florida and New Mexico, reform has come about through the legislative process even in the absence of court suits. Those who are interested in the subject naturally wish to know whether the reforms have been successful. Surprisingly, in most cases, we don't know. The reason is that there is as yet no agreed-upon method for evaluating such reforms. This study constitutes an attempt to define an appropriate methodology for such measurements.

We must first decide what the goals are in reforming school finance. It is then possible to decide from this what to measure, and how to make comparisons to establish how successful a reform has been. In general, the goals of school finance reform have been to neutralize factors that should not influence the inputs or the outcomes of education (such as race, or wealth) in such a way that equals are treated equally and unequals are treated equitably. Ideally, one would do so in such a way that the outcomes of education do not

vary systematically by factors such as race or wealth, or so that the benefits would exceed the costs of education by the same amount for different groups. These are fine ideals, but it is impossible at present to measure them, because we do not have agreement on what the outcomes of education should be, nor do we know how to measure most such outcomes. (We can measure certain academic proficiencies, such as reading and arithmetic, but we do poorly at measuring most things, such as writing ability, citizenship preparation, or moral development.) We are forced, therefore, to fall back on a measure of the inputs of education, consisting of personnel and dollars. This is appropriate, however, because legislators similarly have been forced to try to deal equitably with inputs rather than outcomes for the same reason.

Legislators have tried to reform school finance with certain equalization goals in mind which can be placed into three categories: dealing with differences in ability to support education, differences in educational need, and differences in educational cost. Each needs a brief explanation. Most of the school finance lawsuits have concentrated on differences in district wealth, which results in differences in ability to raise money for the schools through taxes. Most state school finance systems are designed to respond to this by providing more state money for poor districts than for wealthy ones. There are two contrasting philosophies about how to do this. One philosophical position is that the same amount of money should be spent on each child in the state (assuming, for the moment, that they do not differ in their educational needs and that there are no differences in educational costs). The other position is that the state should not dictate the level of expenditure by local districts, but should simply equalize their ability to raise money through taxation, and let each district decide how much it wishes to spend. About half

of the states are currently in each of these philosophical camps.

Everything would be much simpler if all students were the same, but they are not. Some are mentally retarded, with an inability ever to achieve as much educationally as a normal child. Some are physically handicapped. They are potentially capable of achieving as much as a normal child, but need special treatment to help them overcome the effects of their handicaps. Still other children are environmentally handicapped, in that the environment in which they were raised has not prepared them for education as adequately as normal children. For some children, English is not their mother tongue. All of these groups can be said to have greater educational need than normal children. They are "unequals," and must receive different treatment (usually more expensive treatment) in order to be treated equitably. State school finance plans attempt to deal with this problem by providing more for such groups. This is usually done either through a weighting scheme that counts such children extra in assigning state aid to the district, or through separate schemes that reimburse the district for its extra expenses in educating these children.

Finally, it is generally recognized that there are differences in the cost of providing equivalent educational services in different districts of a state. In California, for example, it costs more to provide for heat and snow removal in the Sierras than it does in San Diego, where it never snows. Rural school districts have high costs for pupil transportation, whereas urban school districts have higher costs for security, vandalism, and pupil attendance functions. The greatest difference in cost, however, may result from the fact that some districts are more attractive places to teach than others. These districts may have to pay less to get an equivalent quality

teacher than a less attractive district. All of these are differences in educational cost. Legislatures have tried to deal with some of these, but not with others. State school finance plans usually provide transportation aid. They often also provide extra aid for small school districts, on the assumption that they are suffering from diseconomies of scale. Sometimes extra aid has been provided for the cities, justified by the urban problems mentioned above. There has been, in most states, no attempt to correct for other differences in costs of doing business, such as heating costs, and in only two or three states has there been an attempt to deal with the issue of teacher quality.

Having now placed the equalization goals of school finance into three categories, we can also discern two additional goals which do not have to do with equalization. One is that of insuring an adequate education for the children of the state. It would be an empty promise to equalize wealth, need, and cost in such a way that all children are guaranteed $100 per year spent on their education, at a time when the average expenditure in the U.S. is over $1000 per pupil.

The last goal is not an idealistic one, but an intensely practical one. It is that any finance plan that is proposed must be politically feasible. It must be capable of receiving a majority of votes in both houses of the legislature and the signature of the governor. The result of this overriding consideration is compromises that frequently reduce the extent to which the plan satisfies the other goals.

In analyzing the success or failure of school finance reform, it seems appropriate that we should be concerned with the extent to which the plan

satisfies the goals of adequacy of provision and of equalization for wealth, need, and cost differences. Measurement of attainment of the political goal is unnecessary. The goal has been obtained if legislation passes. One merely assumes that attainment of this goal has diminished to some extent the degree to which the other goals are satisfied.

In the past, those interested in school finance have attempted to compare finance plans by categorizing them. A state is said to have a foundation plan, or a power equalizing plan. It uses categorical aid for pupils with special need, or it uses a weighting plan. The trouble with such classification plans is that there is no pure system. All states have finance plans that are combinations, dictated by the various political compromises that must be made to insure passage. In addition, classification plans cannot easily be compared to see which is better. The National Educational Finance Project attempted to do this in the early 1970s by giving numbers to legal features of the plans that were supposed to represent their desirability.[23] The flaw in such an approach should be obvious.

The only logical approach to comparing state school finance systems is to compare actual distributions of money. One could either look at actual expenditures per pupil, or alternatively at revenue per pupil. The former has an intuitive appeal, because it is what is actually spent on students. Revenue, however, has an attraction in that it can be disaggregated into local, state, and federal money, which is often useful. One can compare the extent

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[23]Roe L. Johns and Kern Alexander, Alternative Programs for Financing Education (Gainesville, Fla.: National Educational Finance Project, 1971), pp. 231-251.

of equalization with local and state money, and then see whether federal money contributes to equalization or does the reverse.

Both the expenditure measure and the revenue measure are input measures. As discussed earlier, it is impossible at present to use a measure of outputs, because there is no agreed-upon measure. The measure of inputs can either be in terms of money, or in terms of the resources the money buys. A resource measure, for example, might be pupil-teacher ratio. A major problem with resource input measures is that one cannot construct a single measure that encompasses all resource inputs. One study of this problem, sponsored by the National Center for Educational Statistics,[24] tested a series of six different measures, some consisting simply of an appropriate definition of current expenditures, and others which attempted to measure resources in some manner, and some which were combinations of the two. The NCES study then proceeds to use very simple analyses of these measures. It provides one measure of adequacy, two of the variation of expenditures or revenues, and one measure of the relationship of expenditures or revenues to other variables such as wealth or race.

Another study is by the School Finance Cooperative.[25] This group is relatively unconcerned with the type of input measure to be used, and much more concerned with the method of analysis. They used as their measure total state and local current revenues per pupil, excluding capital outlay expendi-

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[24] Educational Opportunity: The Concept, its Measurement, and Application (Washington, D.C.: National Center for Education Statistics, Dept. of HEW, 1978).

[25] Robert Berne, "A Methodological Assessment of Education Equality and Wealth Neutrality Measures," (New York: Public Policy Research Institute, New York University, 1978).

tures where possible. However, they tested no fewer than sixteen different analysis measures. Some measure only one variable, and some measure the relationship between two variables. The conclusion is that the measures move in different ways, so that the one to be used depends upon one's values.

Both of these projects suffer from a fundamental defect. Both make the implicit assumption that there are no differences in educational need and no differences in educational cost among school districts in a state. They are concerned only with whether wealth differences have been equalized. The School Finance Cooperative recognizes the two philosophical positions on wealth equalization (equalization of expenditures or equalization of ability to tax); the NCES study does not even recognize this.

This study, on the other hand, recognizes that the situation is more complicated than this, and simple analysis methods of the kind used by the School Finance Cooperative and NCES are apt to be misleading. For example, suppose a state gives additional money to school districts that have large concentrations of disadvantaged in them, on the basis that they have greater educational need. The greatest concentrations of these disadvantaged individuals will be in city school districts, which tend also to be wealthy in terms of taxing ability. A simple measure of the extent to which there has been wealth equalization will make it appear that the state has done a poor job, when it may actually be doing a very good jot if we take into account that it is trying to do two things at the same time: equalize wealth differences and allow for differences in educational need.

What is needed, then, is a set of measures that analyze separately how the state is doing in providing an adequate education, the extent to which

it equalizes for wealth differences (adopting either philosophical position), and how it compensates for differences in educational need and differences in the cost of providing equivalent educational services. This can only be done with a sophisticated statistical technique that allows one to analyze all of the factors at once. Fortunately, one need not be a statistician to understand the results. The following paragraphs present the concepts in sufficient detail for the intelligent layman's comprehension.

The technique used is called multiple regression. What it does is to allow us to see the separate effects of several variables on revenues or expenditures. One could use as many different variables to measure wealth, need, and cost as he wished, but the more variables used, the easier it is to get confused in the interpretation. In addition, it is desirable to use only variables that, at least potentially, can be collected on a comparable basis from all states. This study has used only seven of these variables. It might be desirable later to add one or two more. The seven are:

Wealth equalization

1. Ability: Equalized property valuation per pupil
2. Effort: Equalized tax rate

Need equalization

1. Handicapped: Proportion of special education pupils, as defined by the state
2. Disadvantaged: Proportion of Title I eligible pupils
3. Language handicaps: Proportion of bilingual pupils

Cost equalization

1. Smallness of district. If the district has fewer than 500

students, the importance of this variable increases as the size of the district decreases.

2. Largeness of district. If the district has more than 10,000 students, the importance of this variable increases as the size of the district increases.

It would be desirable to have better measures than this of differing costs, but none are currently available in most states, and for the one or two where data are available they are not comparable across states.

The measures that have been devised for comparing the equity of school finance systems consist of the following:

Measures of the importance of factors in explaining variation in revenue

1. Percentage of variation in revenue (or expenditure) associated with differences in district wealth
2. Percentage of variation in revenue associated with differences in tax rate
3. Percentage of variation in revenue associated with differences in needs and costs (as a group)
4. Percentage of variation in revenue unexplained by any of the above.

Measures of provision for all pupils combined

1. Average revenue per pupil, as a measure of the adequacy of provision.
2. Dispersion of this revenue per pupil. This measure, the coefficient of variation, is zero if all pupils in the state have the same amount spent on them, and increases as the variation in expenditures increases. It is usually a figure between zero and one.

Measures of the provision for normal students and for needs and costs

1. Average revenue for normal students
2. Implied additional weighting for compensatory ed students
3. Implied additional weighting for handicapped students
4. Implied additional weighting for bilingual students
5. Implied additional weighting for students in small districts
6. Implied additional weighting for students in large districts.

Taken as a group, these measures give an excellent picture of the kind of school finance program a state has.[26] Let us see what they look like for four states for which we have data. The four are Connecticut, Illinois, New Jersey, and New Mexico. The measures of importance of factors are given for each of these states for a recent year in Table IV-1. It can readily be seen that the patterns are very different. Connecticut is a state in which a substantial amount of variation in expenditures is associated with differences in wealth, relatively little is associated with tax rate, and a fair amount is associated with differences in needs and costs. This is borne out by knowledge of the Connecticut system as one which consists mainly of a flat grant of $250 per pupil, and rather large categorical programs for special needs. In Connecticut, as in the other states, a substantial portion of the variation is unexplained by any of these factors. The unexplained variation may be the result of provisions in the state finance formula that have little relationship to wealth, tax rate, or needs and costs as measured.

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[26] Technical details of how these measures are calculated are given in the main body of the report from which this description is abstracted.

TABLE IV-1

Measures of the Relative Importance of Factors[1]

	Connecticut 1975-76	Illinois[2] 1974-75	New Jersey 1975-76	New Mexico 1975-76
Wealth Contribution	31%	52%	8%	11%
Tax Rate Contribution	7%	18%	13%	1%
Needs and Costs Contribution	16%	1%	5%	46%
Unexplained Variation	46%	29%	74%	44%

[1]Current expenditures per pupil in Connecticut, state-local current revenue per ADM in other states. The pupil is the unit of analysis.

[2]Unit districts.

Illinois presents a different picture. More than half of the variation in state and local current revenue is associated with variation in district wealth. An additional 18% is associated with differences in tax rate, while only 1% is associated with differences in needs and costs. Based on this, one would say that Illinois has some distance to go in equalizing educational opportunity.

New Jersey is different yet. None of the factors explain very much. Most of the variation is unexplained, and thus the system appears capricious.

Finally, New Mexico, which has been known as a highly equalized state, presents measures that confirm this. Very little of the variation is associated with wealth differences, and almost none with tax rate differences. Almost half of the variation is associated with differences in needs and costs.

Table IV-2 shows the rest of the measures for these four states. Note that the average revenue per pupil is about half again as high in New Jersey as in New Mexico. However, without adequate information on the relative cost of providing equivalent education in the two states, it is impossible to say whether New Jersey is making more adequate provision than New Mexico. This measure of average revenue would be of more value in comparing one state over time than in comparing states with one another, given our present lack of knowledge of cost differences.

The dispersion of revenue is highest in New Jersey and lowest in Illinois. This finding for Illinois is surprising, considering the heavy dependence on wealth and tax rate shown in Table IV-1. The dispersion for Illinois elementary and secondary districts (not shown in the table) is roughly twice that for unit districts. One reason for the low dispersion in unit districts may be the

TABLE IV-2

Measures of Provision for Needs and Costs[1]

	Connecticut 1975-76	Illinois[2] 1974-75	New Jersey 1975-76	New Mexico 1975-76
Average Revenue	$1467	$1254	$1511	$1070
Dispersion of Revenue	.17	.13	.19	.14
Provision for Normal Students	$1323	$1203	$1552	$967
Implied Weightings:				
For Compensatory Ed	-.34	.03	-.26	.52
For Handicapped Ed	2.70	.22	-.49	1.15
For Bilingual Ed	-.24	.04	-.82	1.48
Small Districts, for each 100 below 500	.04	.01	-.00	.24
Large Districts, for each 1000 over 10,000	.02	.00	.00	.00

[1]Based on current expenditures per pupil (not average revenue) in Connecticut, and on state-local current revenue per ADM in other states. The pupil is the unit of analysis.

[2]Unit districts.

large part Chicago plays in the data, since it has about 500,000 of the 1.2 million pupils in unit districts. Another possibility is that if Illinois made more adequate provision for needs and costs the dispersion might be higher, but there is no way of knowing this. It can be seen from this discussion that there are major problems with using either average revenue or dispersion of it as measures of equity, although these are the two measures that have been most used in the past.

The provision for normal pupils is the average amount that would be spent on pupils who were not handicapped, bilingual, or eligible for compensatory education, in districts that were neither large (above 10,000) nor small (below 500). As might be expected (since provision for special needs and costs is ordinarily assumed to cost more than provision for normal students), this figure is less than the average for all students. However, it is actually more in New Jersey. In other words, the effect of the arrangements for school financing in New Jersey appears to be to provide less well in districts with concentrations of pupils with special needs than in districts with few of such pupils.

The implied weightings tell us something about how much additional money a state provides for special needs and costs. For example, New Mexico provided an additional 1.15 times the provision for normal pupils for those with handicaps. The provision for normal pupils is $967. The provision for handicapped pupils, then, is that for normal pupils plus an additional 1.15 times that: $967 + 1.15 x $967 = $2079. In other words, the implied weighting is in addition to that spent on a normal child. Where there is a negative weighting, the provision for the special pupil is actually less than that for normal pupils.

The implied weightings for small districts and large districts should be interpreted as indicated in the table. For example, the weighting of .24 for small districts in New Mexico indicates that for each 100 pupils below a district ADM of 500, the state provides an additional 24% of the provision for normal pupils. For example, this would be the provision in small districts implied by this weighting:

District Size	Computation	Revenue per ADM
400	$967 + .24 x $967 =	$1199
300	$967 + .48 x $967 =	$1431
200	$967 + .72 x $967 =	$1663
100	$967 + .96 x $967 =	$1895

Similarly, in large districts the weighting is applied to each 1000 pupils above 10,000. For example, in Connecticut Hartford has about 29,000 pupil or 19,000 above the 10,000 mark. This implies that Hartford would receive, on account of its size alone, an additional 19 x .02 x $1323 = $503 per pup Because large districts can receive large multiples of the weighting (as in the Hartford example), a low weighting may be of more value to a large dist than a considerably larger weighting is to a small district. In any case, it is interesting to note that only the .24 weighting for small districts in New Mexico and the .02 weighting for large districts in Connecticut app to be of any real importance.

Unfortunately, these implied weightings cannot be treated with the same degree of confidence as the measures of the importance of the factors of wealth, tax rate, and needs and costs. The reason is that there are oft high correlations among the variables representing needs and costs. When

is so, our confidence in the measures is reduced. On the other hand, in the four states studied, there are never high correlations among wealth, tax rate, and any of the variables representing needs and costs.

The measures developed here can be used to assess the equity of a state's school finance system in the following ways:

1. If there is a high dependence upon wealth (that is, if the wealth contribution is high), there has been inadequate wealth equalization.

2. If the tax rate contribution is high at the same time as the wealth contribution is high, this reinforces the feeling that there has been inadequate wealth equalization. On the other hand, if the tax rate contribution is high but the wealth contribution is low, the condition would be characteristic of a good power equalizing system.

3. If the needs and costs contribution is high, this means that the state puts heavy emphasis on providing for special needs and costs. However, since there is no consensus on how much additional should be done for those students with special needs, the question of how equitable this is depends upon one's values.

4. If the unexplained variation is high, the variation in revenue per pupil is not strongly associated with any of the measured variables. This requires additional analysis to determine whether the variation is an equitable one or not, with the presumption (in the absence of additional data) that it is not.

5. Changes in the average revenue and its dispersion can be monitored over time for a state, and may provide information of value, but they are of less value than the other measures developed. Provision for normal pupils is probably a better measure than average revenue.

6. The implied weightings help one apply one's values against the actual provision to assess whether the distribution is an equitable one.

The person looking for a single measure of the equity of a school finance system is trying to simplify matters too much, and risks confounding provision for needs and costs with attempts to equalize expenditures or to produce fiscal neutrality. However, use of only the four measures of the contribution of factors to explanation of variance (wealth contribution, tax rate contribution, needs and costs contribution, and unexplained variation) would provide a comprehensive view of the school finance system that is worth the serious consideration of those who are interested in equity.

APPENDIX A

THE MEASURES

State: Connecticut

Basis: Pupil

	Current Expenditures 1975-76
Percentage of importance of factors:	
Wealth Contribution	31%
Tax Rate Contribution	7%
Needs and Costs Contribution	16%
Unexplained Variation	46%
Average expenditures	$1467
Dispersion of expenditures	.17
Average revenue for normal pupils	$1323
Additional weighting for needs and costs:	
Compensatory ed	-.34
Special ed	2.70
Bilingual ed	-.24
Small schools, for each 100 students below 500	.04
Large schools, for each 1000 students over 10,000	.02

State: Connecticut

Basis: District

	Current Expenditures 1975-76
Percentage importance of factors:	
Wealth Contribution	27%
Tax Rate Contribution	12%
Needs and Costs Contribution	2%
Unexplained Variation	58%
Average expenditure	$1295
Dispersion of expenditure	.35
Average revenue for normal pupils	$1307
Additional weighting for needs and costs:	
Compensatory ed	.36
Special ed	-1.12
Bilingual ed	.04
Small schools, for each 100 students below 500	-.04
Large schools, for each 1000 students over 10,000	.01

State: Illinois Basis: Pupil

State-Local Revenue 1974-75

	Elementary	Secondary	Unit
Percentage importance of factors:			
Wealth Contribution	60%	52%	52%
Tax Rate Contribution	17%	34%	18%
Needs and Costs Contribution	1%	1%	1%
Unexplained Variation	23%	12%	29%
Average revenue	$1279	$1649	$1254
Dispersion of revenue	.26	.21	.13
Average revenue for normal pupils	$1271	$1590	$1203
Additional weighting for needs and costs:			
Compensatory ed	..15	.28	.03
Special ed	-.09	.30	.22
Bilingual ed	.22	.09	.04
Small schools, for each 100 students below 500	-.01	-.01	.01
Large schools, for each 1000 students over 10,000	-.01	-.00	.00

State: Illinois Basis: District

	State-Local Revenue 1974-75		
	Elementary	Secondary	Unit
Percentage importance of factors:			
Wealth Contribution	64%	74%	66%
Tax Rate Contribution	10%	21%	16%
Needs and Costs Contribution	0%	1%	1%
Unexplained Variation	26%	5%	17%
Average revenue	$1266	$1571	$1229
Dispersion of revenue	.36	.29	.20
Average revenue for normal pupils	$1193	$1513	$1198
Additional weighting for needs and costs:			
Compensatory ed	.13	.26*	.15*
Special ed	.34*	.14	.03
Bilingual ed	.07	.46	-.29
Small schools, for each 100 students below 500	.00	-.00	.01
Large schools, for each 1000 students over 10,000	-.02	.00	.00

State: New Jersey Basis: Pupil

	State-Local Revenue		Total Revenue	
	1975-76	1976-77	1975-76	1976-77
Percentage importance of factors:				
Wealth Contribution	8%	10%	7%	10%
Tax Rate Contribution	13%	26%	11%	26%
Needs and Costs Contribution	5%	1%	6%	2%
Unexplained Variation	74%	63%	76%	62%
Average revenue	$1511	$1668	$1523	$1680
Dispersion of revenue	.19	.17	.19	.16
Average revenue for normal pupils	$1552	$1690	$1558	$1698
Additional weighting for needs and costs:				
Compensatory ed	-.26	-.05	-.25	-.05
Special ed	-.49	-.18	-.40	-.27
Bilingual ed	-.82	-.36	-.81	-.34
Small schools, for each 100 students below 500	-.00	.02	-.00	.02
Large schools, for each 1000 students over 10,000	.00	.00	.00	.00

State: New Jersey Basis: District

	State-Local Revenue		Total Revenue	
	1975-76	1976-77	1975-76	1976-77
Percentage importance of factors:				
Wealth Contribution	8%	9%	8%	9%
Tax Rate Contribution	2%	17%	2%	17%
Needs and Costs Contribution	1%	3%	1%	3%
Unexplained Variation	89%	70%	89%	71%
Average revenue	$1513	$1703	$1519	$1710
Dispersion of revenue	.25	.24	.25	.24
Average revenue for normal pupils	$1504	$1685	$1511	$1689
Additional weighting for needs and costs:				
Compensatory ed	-.08	-.05	-.05	-.03
Special ed	1.01	.11	.87	.05
Bilingual ed	-1.20	-.36	-1.18	-.36
Small schools, for each 100 students below 500	-.00	.04	-.01	.04
Large schools, for each 1000 students over 10,000	.00	-.00	.00	.00

State: New Mexico Basis: Pupil

	State-Local Revenue		Total Revenue	
	1974-75	1975-76	1974-75	1975-76
Percentage importance of factors:				
Wealth Contribution	18%	11%	6%	1%
Tax Rate Contribution	3%	1%	0%	1%
Needs and Costs Contribution	38%	46%	43%	44%
Unexplained Variation	41%	44%	51%	54%
Average revenue	$ 948	$1070	$1059	$1211
spersion of revenue	.17	.14	.20	.18
Average revenue for normal pupils	$ 879	$ 967	$ 916	$1067
Additional weighting for needs and costs:				
Compensatory ed	..74	.52	1.19	.75
Special ed	-.61	1.15	1.15	1.33
Bilingual ed	2.82	1.48	5.43	3.07
Small schools, for each 100 students below 500	.25	.24	.25	.24
Large schools, for each 1000 students over 10,000	.00	.00	.00	.00

State: New Mexico Basis: District

	State-Local Revenue		Total Revenue	
	1974-75	1975-76	1974-75	1975-76
Percentage importance of factors:				
Wealth Contribution	8%	5%	5%	2%
Tax Rate Contribution	2%	0%	1%	0%
Needs and Costs Contribution	58%	70%	59%	66%
Unexplained Variation	32%	24%	34%	31%
Average revenue	$1230	$1338	$1387	$1540
Dispersion of revenue	.33	.27	.31	.27
Average revenue for normal pupils	$ 972	$1046	$1040	$1130
Additional weighting for needs and costs:				
Compensatory ed	.18	.30	.78	.87
Special ed	.47	2.82	.86	2.32
Bilingual ed	3.34	.75	4.52	2.61
Small schools, for each 100 students below 500	.23	.22	.21	.20
Large schools, for each 100 students over 10,000	-.00	-.00	.00	.00

APPENDIX B

BASIC DATA ON VARIABLES

State: Connecticut

	1975-76	
	Pupil Basis	District Basis
Means of Variables		
Current Expenditure ($/ADM)	$ 1,467	$ 1,295
Total Revenue ($/ADM)	--	--
Wealth (ENGL per ADM)	$84,179	$72,299
Tax rate (mills)	12.7	11.9
Comp ed (percent of ADM)	12.2%	6.4%
Special ed (percent of ADM)	2.0%	1.3%
Bilingual ed (percent of ADM)	4.4%	1.1%
Number of districts		185
Small districts, percent of total		21.1%
Large districts, percent of total		8.6%
Number of pupils	638,371	
Percent of pupils in small districts	1.2%	
Percent of pupils in large districts	37.0%	

State: Illinois

	Pupil Basis, 1974-75		
	Elementary	Secondary	Unit
Means of Variables			
State-Local Rev ($/ADM)	$ 1,279	$ 1,649	$ 1,254
Total Revenue ($/ADM)	---	---	---
Wealth (EAV per ADM)	$42,134	$77,485	$26,478
Tax rate (mills)	19.8	17.6	27.4
Comp ed (percent of ADM)	8.1%	6.1%	27.6%
Special ed (percent of ADM)	13.7%	6.6%	10.0%
Bilingual ed (percent of ADM)	4.9%	2.6%	8.4%
Number of pupils	476,314	258,501	1,158,056
Percent of pupils in small districts	9.3%	2.3%	2.7%
Percent of pupils in large districts	5.5%	15.3%	52.3%

State: Illinois

	District Basis, 1974-75		
	Elementary	Secondary	Unit
Means of Variables			
State-Local Rev ($/ADM)	$ 1,266	$ 1,571	$ 1,229
Total Revenue ($/ADM)	--	--	--
Wealth (EAV per ADM)	$50,807	$81,867	$29,472
Tax rate (mills)	17.6	16.0	25.3
Comp ed (percent of ADM)	10.2%	9.4%	14.5%
Special ed (percent of ADM)	13.2%	5.2%	10.1%
Bilingual ed (percent of ADM)	3.1%	1.8%	0.8%
Number of districts	431	119	403
Small districts, percent of total	47.1%	26.9%	20.8%
Large districts, percent of total	0.5%	2.5%	2.5%

State: New Jersey

	1975-76		1976-77	
	Pupil	District	Pupil	District
Means of Variables				
State-Local Rev ($/ADM)	$ 1,511	$ 1,513	$ 1,668	$ 1,703
Total Revenue ($?ADM)	$ 1,523	$ 1,519	$ 1,680	$ 1,710
Wealth (EAV per ADM)	$67,021	$228,593	$72,876	$224,246
Tax rate (mills)	18.9	20.2	15.8	15.1
Comp ed (percent of Adm)	14.5%	9.9%	24.5%	19.8%
Special ed (percetn of ADM)	2.1%	2.0%	2.0%	1.7%
Bilingual ed (percent of ADM)	1.4%	0.3%	1.9%	0.5%
Number of districts		582		582
Small districts, percent of total		23.0%		23.2%
Large districts, percent of total		3.6%		3.3%
Number of pupils	1,433,186		1,401,279	
Percent of pupils in small districts	2.5%		2.6%	
Percent of pupils in large districts	27.1%		25.6%	

State: New Mexico

	1974-75		1975-76	
	Pupil	District	Pupil	District
Means of Variables				
State-Local Rev ($/ADM)	$ 948	$ 1,230	$ 1,070	$ 1,338
Total Revenue ($/ADM)	$ 1,059	$ 1,387	$ 1,211	$ 1,540
Wealth (EAV per ADM)	$57,309	$86,957	$64,116	$94,614
Tax rate (mills)	1.2	1.1	1.1	1.1
Comp ed (percent of ADM)	6.0%	10.3%	8.0%	11.7%
Special ed (percent of ADM)	2.1%	1.7%	1.9%	1.5%
Bilingual ed (percent of ADM)	1.0%	1.5%	1.7%	2.2%
Number of districts		88		88
Small districts, percent of total		34.1%		34.1%
Large districts, percent of total		4.5%		4.5%
Number of pupils	273,063		265,374	
Percent of pupils in small districts	2.8%		2.8%	
Percent of pupils in large districts	44.6%		44.4%	

APPENDIX C

CORRELATION MATRICES

State: Connecticut, 1975-76

Basis: Pupil

	Current Exp	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilingual Ed	Small	Large
Current Exp	1.00								
Total Revenue	----								
Wealth	.56	----	1.00						
Tax Rate	-.21	----	-.70	1.00					
Comp Ed	.22	----	-.16	.10	1.00				
Special Ed	.22	----	-.04	-.04	.69	1.00			
Bilingual Ed	.27	----	-.11	.12	.89	.52	1.00		
Small	.03	----	.01	.03	-.04	-.09	-.05	1.00	
Large	.35	----	-.04	.03	.89	.52	.91	-.05	1.00

Basis: District

	Current Exp	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilingual Ed	Small	Large
Current Exp	1.00								
Total Revenue	----	----							
Wealth	.69		1.00						
Tax Rate	.55	----	-.09	1.00					
Comp Ed	.27	----	.06	.21	1.00				
Special Ed	.25	----	.06	.26	.56	1.00			
Bilingual Ed	.15	----	.02	.08	.80	.39	1.00		
Small	-.75	----	-.41	-.61	-.28	-.39	-.13	1.00	
Large	.14	----	.05	.03	.74	.32	.86	-.08	1.00

State: Illinois, Elementary Districts, 1974-75

Basis: Pupil

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	----								
Wealth	.78	----	1.00						
Tax Rate	.35	----	-.14	1.00					
Comp Ed	-.20	----	-.14	-.29	1.00				
Special Ed	.25	----	.17	.23	-.07	1.00			
Bilingual Ed	.33	----	.22	.21	.00	.30	1.00		
Small	-.08	----	.11	-.30	.14	-.04	-.23	1.00	
Large	-.10	----	-.11	.07	-.14	-.06	-.04	-.06	1.00

Basis: District

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	----								
Wealth	.83	----	1.00						
Tax Rate	.07	----	-.33	1.00					
Comp Ed	-.11	----	-.06	-.23	1.00				
Special Ed	.21	----	.10	.19	-.03	1.00			
Bilingual Ed	.35	----	.26	.23	-.15	.29	1.00		
Small	.06	----	.21	-.41	.29	-.05	-.34	1.00	
Large	-.02	----	-.02	.05	-.04	-.01	.01	-.04	1.00

State: Illinois, Secondary Districts, 1974-75

Basis: Pupil

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	----								
Wealth	.72	----	1.00						
Tax Rate	.48	----	-.20	1.00					
Comp Ed	-.30	----	-.12	-.39	1.00				
Special Ed	.23	----	.11	.13	.07	1.00			
Bilingual Ed	.38	----	.37	-.04	.04	.36	1.00		
Small	.01	----	.10	-.10	.19	-.13	-.14	1.00	
Large	.06	----	-.10	.23	-.22	.50	-.08	-.04	1.00

Basis: District

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	----								
Wealth	.83	----	1.00						
Tax Rate	.24	----	-.29	1.00					
Comp Ed	-.10	----	-.02	-.25	1.00				
Special Ed	.01	----	-.11	.16	-.07	1.00			
Bilingual Ed	.23	----	.05	.28	-.22	.34	1.00		
Small	.24	----	.26	-.03	.29	-.18	-.35	1.00	
Large	.03	----	-.03	.14	-.09	.19	.01	-.06	1.00

State. Illinois, Unit Districts, 1974-75

Basis: Pupil

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	----								
Wealth	.73	----	1.00						
Tax Rate	.41	----	-.16	1.00					
Comp Ed	.22	----	-.03	.34	1.00				
Special Ed	.12	----	.05	.09	-.11	1.00			
Bilingual Ed	.37	----	.08	.48	.77	-.07	1.00		
Small	.15	----	.20	-.05	-.09	.04	-.13	1.00	
Large	.35	----	.11	.40	.86	-.18	.93	-.11	1.00

Basis: District

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	----								
Wealth	.81	----	1.00						
Tax Rate	.22	----	-.23	1.00					
Comp Ed	-.04	----	-.11	-.06	1.00				
Special Ed	.05	----	.00	.08	.15	1.00			
Bilingual Ed	.04	----	-.03	.25	-.02	.08	1.00		
Small	.38	----	.32	.11	.09	.05	-.06	1.00	
Large	.02	----	-.01	.06	.16	-.01	.36	-.02	1.00

State: New Jersey, 1975-76

Basis: Pupil

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	.99	1.00							
Wealth	.21	.20	1.00						
Tax Rate	.27	.27	-.03	1.00					
Comp Ed	-.12	-.07	-.23	.25	1.00				
Special Ed	-.04	-.02	-.16	.23	.61	1.00			
Bilingual Ed	-.19	-.16	-.17	.16	.62	.36	1.00		
Small	.00	-.00	.10	-.07	-.01	.01	-.06	1.00	
Large	.03	.09	-.17	.24	.74	.39	.35	-.05	1.00

Basis: District

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	.99	1.00							
Wealth	.29	.29	1.00						
Tax Rate	-.16	-.16	-.01	1.00					
Comp Ed	-.05	-.04	-.04	-.03	1.00				
Special Ed	.02	.02	-.07	-.05	.29	1.00			
Bilingual Ed	-.09	-.08	-.01	-.01	.34	.11	1.00		
Small	.02	.01	.17	.14	.11	-.09	-.10	1.00	
Large	-.01	-.00	-.01	.00	.26	.08	.20	-.05	1.00

State: New Jersey, 1976-77

Basis: Pupil

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	.99	1.00							
Wealth	.25	.24	1.00						
Tax Rate	.48	.45	-.16	1.00					
Comp Ed	-.19	-.15	-.18	-.22	1.00				
Special Ed	-.12	-.10	-.17	-.07	.49	1.00			
Bilingual Ed	-.14	-.10	-.19	-.09	.64	.55	1.00		
Small	.05	.05	.11	-.06	-.03	-.03	-.07	1.00	
Large	-.16	-.09	-.18	-.27	.67	.43	.63	-.05	1.00

Basis: District

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	.99	1.00							
Wealth	.28	.29	1.00						
Tax Rate	.34	.34	-.14	1.00					
Comp Ed	-.04	-.03	-.06	.07	1.00				
Special Ed	.00	.00	-.06	.11	.24	1.00			
Bilingual Ed	-.03	-.03	-.01	.07	.28	.21	1.00		
Small	.15	.15	.17	-.20	-.08	-.09	-.12	1.00	
Large	-.04	-.03	-.01	-.02	.20	.11	.32	.05	1.00

State: New Mexico, 1974-75

Basis: Pupil

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	.86	1.00							
Wealth	.49	.36	1.00						
Tax Rate	-.04	-.19	-.42	1.00					
Comp Ed	.36	.50	.09	-.21	1.00				
Special Ed	-.23	-.19	-.37	.42	-.05	1.00			
Bilingual Ed	.29	.45	.05	-.12	.50	-.06	1.00		
Small	.61	.49	.14	.03	.18	-.21	.04	1.00	
Large	-.16	-.29	-.10	.10	-.38	.14	-.26	-.10	1.00

Basis: District

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	.94	1.00							
Wealth	.35	.28	1.00						
Tax Rate	.13	.11	-.32	1.00					
Comp Ed	.22	.35	-.04	.00	1.00				
Special Ed	-.39	-.35	-.31	.13	-.08	1.00			
Bilingual Ed	.14	.23	-.13	.09	.29	-.07	1.00		
Small	.82	.77	.14	.09	.20	-.41	.01	1.00	
Large	.10	-.12	-.06	.03	-.10	.04	-.06	-.07	1.00

State: New Mexico, 1975-76

Basis: Pupil

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	.81	1.00							
Wealth	.37	.18	1.00						
Tax Rate	-.08	-.16	-.48	1.00					
Comp Ed	.31	.43	.08	-.22	1.00				
Special Ed	-.20	-.14	-.37	.50	-.14	1.00			
Bilingual Ed	.20	.39	-.12	.07	.38	.08	1.00		
Small	.65	.49	.12	-.01	.17	-.25	-.01	1.00	
Large	-.19	-.32	-.10	-.10	-.35	-.17	-.31	-.10	1.00

Basis: District

	State-Loc Rev	Total Rev	Wealth	Tax Rate	Comp Ed	Special Ed	Bilin-gual Ed	Small	Large
State-Local Revenue	1.00								
Total Revenue	.92	1.00							
Wealth	.26	.15	1.00						
Tax Rate	.00	.01	-.43	1.00					
Comp Ed	.23	.40	-.14	-.01	1.00				
Special Ed	-.45	-.40	-.33	.24	-.17	1.00			
Bilingual Ed	.00	.21	-.19	.08	.47	.05	1.00		
Small	.85	.76	.09	.02	.22	-.53	-.06	1.00	
Large	-.10	-.12	-.05	.02	-.10	.03	-.06	-.07	1.00

APPENDIX D

UNIVARIATE AND BIVARIATE MEASURES

FOR THE FOUR STATES

In the proposal approved by NIE, the intent of this project was to develop a set of univariate and/or bivariate measures to measure the equity of school finance systems. However, the approval mechanism for unsolicited proposals at that time was such that the project was approved approximately eleven months after it had been proposed. Meanwhile, events had caught up with it. The School Finance Cooperative was formed, of researchers in the field of school finance who have received grants from Ford Foundation or NIE, and they were charged with calculating just such a set of measures from data bases available to them. The work of coordinating the effort and of analyzing the pros and cons of the measures was given to Robert Berne, of New York University. I was thus faced with another group charged with the same job as I had proposed, and in a position to do it faster. It turns out that this was fortunate, for as I have explained in the body of the report, the idea of using univariate or bivariate measures is substantially flawed. I came to realize this during the deliberations of the School Finance Cooperative, of which I was a part. The result was the development of the multivariate method described in this report. I believe it to be a significant improvement on the univariate or bivariate measures. However, as a part of the School Finance Cooperative, I did the analyses for Florida, New Mexico, and Texas. The results are given here, mainly to indicate that I have fulfilled the letter of the proposal, as well as having gone significantly beyond it.

The analyses were done for the years 1972-73 through 1975-76 for Florida, the same years for New Mexico, and 1974-75 through 1975-76 for Texas. They were done on both a district and pupil basis for all cases, and in addition on a weighted pupil basis for Florida for 1973-74 and 1974-75. Variable descriptions are given on the first data sheet for each state. The descriptions of the measures are as follows:

1. Mean Expenditure. This is simply the mean of the revenue variable, as a measure of adequacy.

2. Range. The difference in dollars between the highest and lowest districts in revenue per ADM. This, and the following measures up through number 10, are univariate measures of equality of revenue.

3. Restricted Range. The range between the 95th percentile and the fifth percentile (of districts or pupils, depending upon the unit of analysis).

4. Federal Range Ratio. Restricted range divided by the revenue at the revenue fifth percentile.

5. Relative Mean Deviation. The mean of the absolute value of the deviation of revenue for a district or pupil from the mean from the state, divided by the mean revenue for the state.

6. Permissible Variance. The ratio of the actual total revenues for districts below the median to the total revenues that would be required for these districts if they were spending at the median.

7. Variance. This is simply the square of the standard deviation of the revenue distribution.

8. Coefficient of Variation. The standard deviation of the revenue distribution divided by the mean revenue.

9. Standard Deviation of Logarithms. This is the standard deviation of natural logarithms of revenues.

10. Gini Coefficient. The ratio of the area between the diagonal and the Lorenz curve to the area between the diagonal and the axes, where the districts are ranked in ascending order of revenues.

11. Simple Correlation of Revenues and Wealth. This and the remaining measures (except 17 and 18) are bivariate measures, using revenues and wealth, as means of measuring fiscal neutrality.

12. Slope from the Simple Regression of Wealth on Revenues. This is the number of dollars of increased revenue per ADM for each $1,000 of increased property value per ADM.

13. Slope from the Regression Using Wealth and Wealth^2. It is calculated from the regression $Rev = a + b_1W + b_2W^2$, and $= b_1 + 2b_2\overline{W}$.

14. Slope from the Regression Using Wealth, Wealth^2, and Wealth^3. This is calculated from the regression $Rev = a + b_1W + b_2W^2 + b_3W^3$, and is $= b_1 + 2b_2\overline{W} + 3b_3(\overline{W})^2$.

15. Estimated Difference in Revenues between Two Values of Wealth. This measure is defined as the difference between two predicted values of revenue where the prediction equation is $Rev = a + b_1W + b_2W^2 + b_3W^3$. The values of W are the mean plus or minus one standard deviation of W.

16. Hickrod Gini. This is the Gini Coefficient calculated when the districts are arrayed in ascending order of wealth.

17. Mean of Wealth. The mean of the wealth measure.

18. Standard Deviation of Wealth.

19. Elasticity Based on the Slope from the Simple Regression. This is the slope from 12 above times mean wealth, divided by mean revenues.

20. Elasticity Based on Slope from W and W^2. This is the slope from 13 above times mean wealth, divided by mean revenue.

21. Elasticity Based on Slope from W, W^2 and W^3. This is the slope from 14 above times mean wealth divided by mean revenue.

The properties of each of these measures have been carefully examined and explained by Robert Berne, and there is no point in repeating that explanation here.[1] The tables giving the measures I calculated for the School Finance Cooperative effort follow.

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[1]The most available source for this explanation is Robert Berne, "Alternative Equity and Equality Measures: Does the Measure Make a Difference?" in Esther Tron, ed., Selected Papers in School Finance, 1978 (Washington, D.C.: U.S. Dept. of HEW, 1978). A more complete description, with examples from the data calculated by the School Finance Cooperative, is in Robert Berne, "A Methodological Assessment of Education Equality and Wealth Neutrality Measures," (New York: Public Policy Research Institute, New York University, 1978).

STATE -- FLA

YEAR -- 1972

DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 67

NUMBER OF PUPILS -- 1369723

NUMBER OF WEIGHTED PUPILS --

MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY		UNIT OF ANALYSIS: DISTRICT	UNWEIGHTED PUPIL	WEIGHTE PUPIL
1.	MEAN EXP	970.11000	953.88000	0.00000
2.	RANGE	493.58000	493.58000	0.00000
3.	RES RANGE	378.00000	221.46000	0.00000
4.	FED R R	.46280	.26270	0.00000
5.	REL MN DEV	.09130	.07310	0.00000
6.	PERM VAR	.91182	.94384	0.00000
7.	VAR	12513.00000	7091.50000	0.00000
8.	COEF VAR	.11531	.08828	0.00000
9.	STD DEV LGS	.11400	.08900	0.00000
10.	GINI	.06358	.04906	0.00000
11.	SIM CORR	.57319	.76347	0.00000
12.	SLOPE W	3.55860	3.74280	0.00000
13.	SLOPE W2	3.26910	3.76540	0.00000
14.	SLOPE W3	3.33710	4.40850	0.00000
15.	EXP DIF	118.72000	142.21000	0.00000
16.	HICK GINI	.00123	0.00000	0.00000
17.	MEAN W	35.97500	38.41300	0.00000
18.	STD DEV W	18.01700	17.17800	0.00000
19.	ELAST W	.13197	.15072	0.00000
20.	ELAST W2	.12123	.15163	0.00000
21.	ELAST W3	.12375	.17753	0.00000

Variable descriptions:

1. Pupil (unweighted): Average Daily Attendance (ADA).
2. Revenues: Local and state revenues.
3. Wealth: Equalized Assessed Value.
4. Districts: All

STATE -- FLA

YEAR -- 1973

DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 67

NUMBER OF PUPILS -- 1397320

NUMBER OF WEIGHTED PUPILS -- 188982

MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY		UNIT OF ANALYSIS: DISTRICT	UNIT OF ANALYSIS: UNWEIGHTED PUPIL	UNIT OF ANALYSIS: WEIGHTED PUPIL
1.	MEAN EXP	1179.10000	1187.30000	877.86000
2.	RANGE	607.83000	607.83000	434.62000
3.	RES RANGE	469.75000	309.32000	219.92000
4.	FED R R	.48180	.30400	.29210
5.	REL MN DEV	.09875	.09430	.05993
6.	PERM VAR	.91280	.92016	.93787
7.	VAR	21281.00000	16061.00000	5738.60000
8.	COEF VAR	.12372	.10674	.08629
9.	STD DEV LGS	.12100	.10700	.08500
10.	GINI	.06863	.05980	.04052
11.	SIM CORR	.31919	.61781	.57861
12.	SLOPE W	1.38770	3.25950	2.54410
13.	SLOPE W2	2.80790	4.69620	3.73250
14.	SLOPE W3	2.42620	4.85070	3.92400
15.	EXP DIF	143.32000	226.91000	130.02000
16.	HICK GINI	.00080	0.00000	0.00000
17.	MEAN W	49.98000	54.59200	40.36500
18.	STD DEV W	33.55300	24.02100	17.22900
19.	ELAST W	.05882	.14987	.11698
20.	ELAST W2	.11902	.21593	.17162
21.	ELAST W3	.10284	.22303	.18043

Variable descriptions:

1. a. Pupils (unweighted): See Table (Florida, 1972).

   b. Pupils (weighted): Weighted FTE, as per schedule on next page.

2. Revenues: See Table (Florida, 1972).

3. Wealth: See Table (Florida, 1972).

4. Districts: See Table (Florida, 1972).

Weights for Various Educational Programs in Florida, 1975-76

Basic Programs	
Kindergarten and Grades 1, 2, and 3	1.234
Grades 4 through 9	1.00
Grades 10, 11, and 12	1.10
Special Programs for Exceptional Students	
Educable mentally retarded	2.30
Trainable mentally retarded	3.00
Physically handicapped	3.50
Physical and occupational therapy, part-time	6.00
Speech and hearing therapy, part-time	10.00
Deaf	4.00
Visually handicapped, part-time	10.00
Visually handicapped	3.50
Emotionally disturbed, part-time	7.50
Emotionally disturbed	3.70
Socially maladjusted	2.30
Specific learning disability, part-time	7.50
Specific learning disability	2.30
Gifted, part-time	3.00
Hospital and homebound, part-time	15.00
Vocational-Technical Programs*	
Vocational Education I	4.26
Vocational Education II	2.64
Vocational Education III	2.18
Vocational Education IV	1.69
Vocational Education V	1.40
Vocational Education VI	1.17
Adult Education Programs	
Adult basic education and adult high school	1.28
Community service	0.675

*Vocational-technical programs are put into one of six categories depending upon the relative cost of providing the program. Most expensive are certain shop courses using a great deal of expensive equipment; least expensive are secretarial courses.

Source: Jack Leppert, Larry Huxel, Walter Garms, and Heber Fuller, "Pupil Weighting Programs in School Finance Reform," in *School Finance Reform: A Legislators' Handbook*, eds. John J. Callahan and William H. Wilken (Washington, D.C.: National Conference of State Legislatures, 1976).

STATE -- FLA
YEAR -- 1974
DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 67
NUMBER OF PUPILS -- 1416524
NUMBER OF WEIGHTED PUPILS -- 1992514

	MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY	UNIT OF ANALYSIS: DISTRICT	UNIT OF ANALYSIS: UNWEIGHTED PUPIL	UNIT OF ANALYSIS: WEIGHTED PUPIL
1.	MEAN EXP	1341.40000	1343.60000	955.21000
2.	RANGE	712.47000	712.47000	320.54000
3.	RES RANGE	416.01000	339.31000	243.47000
4.	FED R R	.35890	.28500	.28590
5.	REL MN DEV	.07585	.07383	.06783
6.	PERM VAR	.91621	.92116	.96979
7.	VAR	17674.00000	13234.00000	3586.80000
8.	COEF VAR	.09911	.08562	.06270
9.	STD DEV LGS	.09800	.08700	.06200
10.	GINI	.05413	.04824	.04095
11.	SIM CORR	.42343	.73303	.65363
12.	SLOPE W	1.79790	3.08390	2.12180
13.	SLOPE W2	1.75080	3.21940	2.10250
14.	SLOPE W3	1.78980	3.24920	1.86050
15.	EXP DIF	109.96000	176.88000	72.67900
16.	HICK GINI	.00165	0.00000	.00179
17.	MEAN W	60.56700	71.00800	50.48100
18.	STD DEV W	31.31200	27.34400	18.45800
19.	ELAST W	.0811A	.16298	.11213
20.	ELAST W2	.07905	.17014	.11111
21.	ELAST W3	.08081	.17172	.09832

Variable descriptions:

1. a. Pupils (unweighted): See Table (Florida, 1972).

   b. Pupils (weighted): See Table (Florida, 1973).

2. Revenues: See Table (Florida, 1972).

3. Wealth: See Table (Florida, 1972).

4. Districts: See Table (Florida, 1972).

STATE -- FLA

YEAR -- 1975

DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 67

NUMBER OF PUPILS -- 1416516

NUMBER OF WEIGHTED PUPILS --

	MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY	UNIT OF ANALYSIS: DISTRICT	UNIT OF ANALYSIS: UNWEIGHTED PUPIL	UNIT OF ANALYSIS: WEIGHTE PUPIL
1.	MEAN EXP	1344.30000	1374.80000	0.00000
2.	RANGE	753.44000	753.44000	0.00000
3.	RES RANGE	402.92000	359.62000	0.00000
4.	FED R R	.35560	.30570	0.00000
5.	REL MN DEV	.08314	.08560	0.00000
6.	PERM VAR	.92460	.94676	0.00000
7.	VAR	19866.00000	18055.00000	0.00000
8.	COEF VAR	.10485	.09774	0.00000
9.	STD DEV LGS	.10300	.09800	0.00000
10.	GINI	.05779	.05507	0.00000
11.	SIM CORR	.54038	.77344	0.00000
12.	SLOPE W	1.97090	3.28320	0.00000
13.	SLOPE W2	1.74060	3.36150	0.00000
14.	SLOPE W3	1.99870	3.67240	0.00000
15.	EXP DIF	138.34000	223.15000	0.00000
16.	HICK GINI	.00340	.00545	0.00000
17.	MEAN W	69.10400	79.96100	0.00000
18.	STD DEV W	38.64300	31.65500	0.00000
19.	ELAST W	.10131	.19096	0.00000
20.	ELAST W2	.08948	.19551	0.00000
21.	ELAST W3	.10274	.21359	0.00000

Variable descriptions:

See Table (Florida, 1972).

STATE -- N M

YEAR -- 1972

DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 88

NUMBER OF PUPILS -- 276155

NUMBER OF WEIGHTED PUPILS --

	MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY	UNIT OF ANALYSIS: DISTRICT	UNIT OF ANALYSIS: UNWEIGHTED PUPIL	UNIT OF ANALYSIS: WEIGHTED PUPIL
1.	MEAN EXP	948.09000	781.38000	0.00000
2.	RANGE	958.66000	968.66000	0.00000
3.	RES RANGE	684.85000	986.48000	0.00000
4.	FED R R	.96620	.41070	0.00000
5.	REL MN DEV	.19507	.10599	0.00000
6.	PERM VAR	.88711	.99522	0.00000
7.	VAR	54820.00000	14208.00000	0.00000
8.	COEF VAR	.24696	.15255	0.00000
9.	STD DEV LGS	.22500	.13200	0.00000
10.	GINI	.13035	.06804	0.00000
[illegible]	SIM CORR	.49993	.48140	0.00000
[illegible]	SLOPE W	2.07610	1.78890	0.00000
13.	SLOPE W2	2.81300	1.36960	0.00000
14.	SLOPE W3	2.93590	.06527	0.00000
15.	EXP DIF	345.31000	36.80400	0.00000
16.	HICK GINI	0.00000	.00046	0.00000
17.	MEAN W	68.31800	46.36000	0.00000
18.	STD DEV W	56.38300	32.07600	0.00000
19.	ELAST W	.14960	.10614	0.00000
20.	ELAST W2	.20270	.08126	0.00000
21.	ELAST W3	.21156	.00387	0.00000

Variable descriptions:

1. Pupils (unweighted): Average Daily Membership (ADM).
2. Revenues: Local and state revenues plus Federal impact aid (PL 874 revenue).
3. Wealth: Equalized Assessed Value
4. Districts: All

STATE -- N M

YEAR -- 1973

DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 88

NUMBER OF PUPILS -- 273743

NUMBER OF WEIGHTED PUPILS --

	MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY	UNIT OF ANALYSIS: DISTRICT	UNIT OF ANALYSIS: UNWEIGHTED PUPIL	UNIT OF ANALYSIS: WEIGHTE PUPIL
1.	MEAN EXP	1067.80000	839.60000	0.00000
2.	RANGE	2761.80000	2761.80000	0.00000
3.	RES RANGE	979.60000	365.61000	0.00000
4.	FED R R	1.27440	.49730	0.00000
5.	REL MN DEV	.2376A	.10974	0.00000
6.	PERM VAR	.86849	.97606	0.00000
7.	VAR	147930.00000	22733.00000	0.00000
8.	COEF VAR	.36021	.17958	0.00000
9.	STD DEV LGS	.27700	.14000	0.00000
10.	GINI	.1604A	.06968	0.00000
11.	SIM CORR	.32739	.36344	0.00000
12.	SLOPE W	1.95010	1.51110	0.00000
13.	SLOPE W2	2.84730	.71979	0.00000
14.	SLOPE W3	2.98130	-.11484	0.00000
15.	EXP DIF	407.22000	15.80400	0.00000
16.	HICK GINI	0.00000	0.00000	0.00000
17.	MEAN W	76.21200	51.26800	0.00000
18.	STD DEV W	64.57400	36.26300	0.00000
19.	ELAST W	.1391A	.09227	0.00000
20.	ELAST W2	.20322	.04395	0.00000
21.	ELAST W3	.2127A	-.00701	0.00000

Variable descriptions:

See Table (New Mexico, 1972).

STATE -- N M

YEAR -- 1974

DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 88

NUMBER OF PUPILS -- 273063

NUMBER OF WEIGHTED PUPILS --

MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY		UNIT OF ANALYSIS: DISTRICT	UNWEIGHTED PUPIL	WEIGHTED PUPIL
1.	MEAN EXP	1230.00000	947.99000	0.00000
2.	RANGE	1922.10000	1922.10000	0.00000
3.	RES RANGE	1205.30000	356.38000	0.00000
4.	FED R R	1.42490	.42930	0.00000
5.	REL MN DEV	.25744	.09324	0.00000
6.	PERM VAR	.87254	.94382	0.00000
7.	VAR	160760.00000	25491.00000	0.00000
8.	COEF VAR	.32599	.16842	0.00000
9.	STD DEV LGS	.28900	.13300	0.00000
10.	GINI	.16842	.06447	0.00000
11.	SIM CORR	.34503	.49183	0.00000
12.	SLOPE W	1.73250	1.67990	0.00000
13.	SLOPE W2	2.78940	1.46720	0.00000
14.	SLOPE W3	3.07780	1.06230	0.00000
15.	EXP DIF	538.77000	95.46200	0.00000
16.	HICK GINI	0.00000	0.00000	0.00000
17.	MEAN W	86.95700	57.30900	0.00000
18.	STD DEV W	79.85200	46.74400	0.00000
19.	ELAST W	.12248	.10156	0.00000
20.	ELAST W2	.19720	.08870	0.00000
21.	ELAST W3	.21759	.06422	0.00000

Variable descriptions:

See Table (New Mexico, 1972).

STATE -- N M

YEAR -- 1975

DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 88

NUMBER OF PUPILS -- 265374

NUMBER OF WEIGHTED PUPILS --

	MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY	UNIT OF ANALYSIS: DISTRICT	UNIT OF ANALYSIS: UNWEIGHTED PUPIL	UNIT OF ANALYSIS: WEIGHTED PUPIL
1.	MEAN EXP	1338.40000	1069.50000	0.00000
2.	RANGE	1554.80000	1554.80000	0.00000
3.	RES RANGE	1094.40000	353.12000	0.00000
4.	FED R R	1.10420	.37230	0.00000
5.	REL MN DEV	.22618	.07592	0.00000
6.	PERM VAR	.90886	.96132	0.00000
7.	VAR	134270.00000	21467.00000	0.00000
8.	COEF VAR	.27378	.13699	0.00000
9.	STD DEV LGS	.25100	.11300	0.00000
10.	GINI	.14511	.05236	0.00000
11.	SIM CORR	.26419	.37259	0.00000
12.	SLOPE W	1.08010	1.02680	0.00000
13.	SLOPE W2	1.88680	.77756	0.00000
14.	SLOPE W3	2.34430	.54014	0.00000
15.	EXP DIF	469.35000	57.43300	0.00000
16.	HICK GINI	0.00000	0.00000	0.00000
17.	MEAN W	94.91600	64.11600	0.00000
18.	STD DEV W	89.62400	53.16500	0.00000
19.	ELAST W	.07630	.06156	0.00000
20.	ELAST W2	.13381	.04661	0.00000
21.	ELAST W3	.16625	.03238	0.00000

Variable descriptions:

See Table (New Mexico, 1972).

STATE -- TEXAS | NUMBER OF DISTRICTS -- 1090

YEAR -- 1974 | NUMBER OF PUPILS -- 2531541

DISTRICT TYPE -- 1 | NUMBER OF WEIGHTED PUPILS --

MEASURES OF MEAN EQUALITY, AND FISCAL NEUTRALITY		UNIT OF ANALYSIS: DISTRICT	UNWEIGHTED PUPIL	WEIGHTED PUPIL
1.	MEAN EXP	1255.40000	1029.50000	0.00000
2.	RANGE	25164.00000	25164.00000	0.00000
3.	RES RANGE	1530.50000	750.58000	0.00000
4.	FED R R	2.17390	1.11200	0.00000
5.	REL MN DEV	.34930	.16089	0.00000
6.	PERM VAR	.82835	.83930	0.00000
7.	VAR	1245400.00000	63494.00000	0.00000
8.	COEF VAR	.88896	.24476	0.00000
9.	STD DEV LGS	.39200	.22600	0.00000
10.	GINI	.24476	.12099	0.00000
11.	SIM CORR	.72107	.60420	0.00000
12.	SLOPE W	.87748	1.48970	0.00000
13.	SLOPE W2	1.40560	1.74540	0.00000
14.	SLOPE W3	.81491	2.05500	0.00000
15.	EXP DIF	1478.80000	418.82000	0.00000
16.	HICK GINI	.00510	.01880	0.00000
17.	MEAN W	275.07000	93.41400	0.00000
18.	STD DEV W	916.82000	101.89000	0.00000
19.	ELAST W	.19226	.13517	0.00000
20.	ELAST W2	.30798	.15837	0.00000
21.	ELAST W3	.17855	.18647	0.00000

Variable descriptions:

1. Pupil (unweighted): Average Daily Attendance (ADA).
2. Revenues: Local and state revenues.
3. Wealth: Governor's Office equalized value in 1975 divided by 1975 ADA.
4. Districts: All.

STATE -- TEXAS

YEAR -- 1975

DISTRICT TYPE -- 1

NUMBER OF DISTRICTS -- 1090

NUMBER OF PUPILS -- 2536472

NUMBER OF WEIGHTED PUPILS --

UNIT OF ANALYSIS

	MEASURES OF MEAN, EQUALITY, AND FISCAL NEUTRALITY	DISTRICT	UNWEIGHTED PUPIL	WEIGHTED PUPIL
1.	MEAN EXP	1510.40000	1232.30000	0.00000
2.	RANGE	67188.00000	67188.00000	0.00000
3.	RES RANGE	1747.10000	776.15000	0.00000
4.	FED R R	1.9727[illegible]	.88760	0.00000
5.	REL MN DEV	.3555[illegible]	.14028	0.00000
6.	PERM VAR	.8494[illegible]	.88372	0.00000
7.	VAR	4681800.0000[illegible]	7[illegible]544.00000	0.00000
8.	COEF VAR	1.4326[illegible]	.22451	0.00000
9.	STD DEV LGS	.3770[illegible]	.18900	0.00000
10.	GINI	.2461[illegible]	.10395	0.00000
11.	SIM CORR	.6684[illegible]	.62227	0.00000
12.	SLOPE W	1.5776[illegible]	1.72000	0.00000
13.	SLOPE W2	1.0690[illegible]	1.85100	0.00000
14.	SLOPE W3	.79846	2.28780	0.00000
15.	EXP DIF	1464.1000[illegible]	[illegible]55.86000	0.00000
16.	HICK GINI	.0004[illegible]	.01883	0.00000
17.	MEAN W	275.0700[illegible]	93.52700	0.00000
18.	STD DEV W	916.8200[illegible]	99.61300	0.00000
19.	ELAST W	.28731	.13054	0.00000
20.	ELAST W2	.1946[illegible]	.14048	0.00000
21.	ELAST W3	.14541	.17364	0.00000

Variable descriptions:

See Table (Texas, 1974).